

# The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XII: No. 10:

New York, Thursday, September 4, 1873.

Four Dollars a Year.  
Single Copies, Ten Cents.

## Fifteen-Ton Steam Hammer at the Vienna Exhibition.

The great development which has taken place during the last ten years in the manufacture of large forgings of both iron and steel, has given rise to the construction of large and powerful steam hammers, which should enable such heavy masses to be successfully worked. Steam hammers of 10 to 15 tons weight, with a correspondingly large stroke, have, therefore, become necessary tools, the construction of which demands great strength and simplicity. The building of steam hammers has been taken up on the Continent to a considerable extent by the Markische Maschinenbau-Anstalt, formerly Messrs. Kamp & Co., of Wetter-on-the-Ruhr, in Westphalia, who are the exhibitors of the large steam hammer in the central part of the Machinery Hall at the Vienna Exhibition, a hammer of which we publish this week an illustration, for which we are indebted to our English contemporary, *Engineering*. This hammer is an original design of the firm above named, which has been continually improved and simplified from practical results during the last seven or eight years, so that the hammer, as shown at Vienna, may be considered to fairly represent its makers' latest practice.

It lies in the nature of a steam hammer that the greater the effect upon the pieces to be forged the greater are the destructive consequences with respect to itself. The proper acknowledgment of these consequences forms the principle upon which the design has been based, the problem being to counteract the effects in the most efficient manner. Referring to our illustration, it will be seen that the standards of the hammer, carrying on the top the steam cylinder, are placed on a wrought iron girder, supported by two wrought iron columns, an arrangement which gives a certain elasticity to the whole construction, while at the same time it affords a larger space around the anvil of the hammer, and thus facilitates the free movements of the workmen. For most cases a span of 20 ft. from center to center of the column will be sufficient, whilst for the manufacture of very difficult forgings, a span of 25 ft. may be useful. The span in the 15-ton hammer, shown in our engraving, is 20 ft. 9 in.

The two heavy cast iron standards offer a sufficient mass for counteracting the heavy and destructive rebounding blows of the hammer. The wrought iron bridge keeps these masses of iron firmly together, and prevents any giving way of the uprights. These latter are not only connected by a number of tightly fitted bolts, but both uprights or standards are also fitted closely against the upper and lower cover plates of the girder, so that a movement would necessitate the shearing of all the rivets that pass through the plates.

The arrangement and working of the hammer is very simple, and will easily be understood from the engraving, but we may state that the piston and piston rod are made of best crucible cast steel, and that the hammer is single acting, and is provided with double seated equilibrium valves, which are worked by hand.

The weight of the top of the hammer is, as stated above, 15 tons, the height of fall 8 ft. 3 in., the diameter of the cylinder 3 ft. 8 1/4 in. (1.098 m.), and the total weight of the hammer without block and anvil is 87,500 kilogrammes, or 87 1/2 tons, distributed in about the following manner: Each upright, or standard, 14 1/2 tons; cylinder, 5 tons; bed-plate for cylinder at the top of uprights, 5 1/2; bed-plates for foundation, 7 tons; each wrought iron column, 2 1/2 tons; bridge, 6 1/2 tons; top, with piston and piston rod, 15 tons. Considering the insufficient lifting appliances that were available in the machinery hall of the Vienna Exhibition during the time of installation, the erection of this hammer was a work of considerable difficulty. The chief dimensions of the other hammers built by the Markische Maschinenbau-Anstalt on the same system are:

Weight of Top.	Height of Fall.	Diam. of Cylinder.
tons.	ft. in.	ft. in.
15	8 3/4	3 8 1/4
10	7 8 1/2	3 7 1/2
7 1/2	5 10	3 10
5 1/2	5 2	2 10
5	5 2	2 6

The two last named hammers are used for the forging of disc wheels, and work with steam acting above the piston, whilst the others act by their own weight only. All the hammers are provided with hand-worked valves.

## The Milwaukee Iron Company and its Works.

(Correspondence of The Iron Age.)

MILWAUKEE, Wis., Aug. 15, 1873.

Although it is only within a very few years that Milwaukee has enjoyed the advantages resulting from the establishment of iron manufacture within its limits, it has already developed a capacity for growth and progress in this direction which give promise that, at no distant day, it will become one of the most important iron manufacturing centers on the

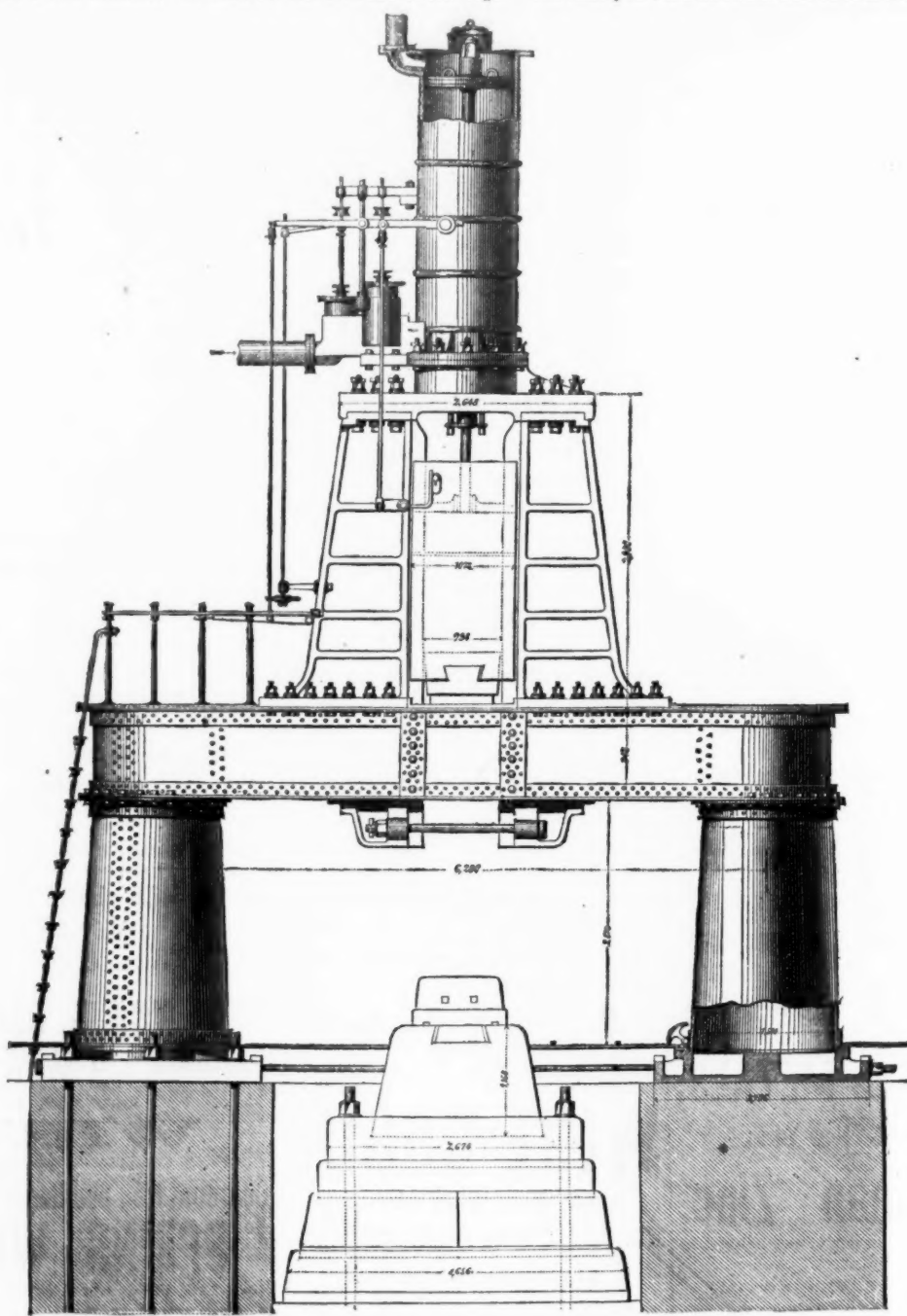
lakes. With a population of eighty thousand, a lake frontage and harbor of more than average excellence, and an extensive and far reaching railway system, there is no apparent reason why Milwaukee should not take a position in the front rank of iron producing and manufacturing cities. Wisconsin yields an abundance of ores of good quality, and many sources of supply have already been opened and brought by railway lines within easy distance of the city. One of the most prominent locations, at present, from whence are obtained iron ores, is the famous Iron Ridge, of Dodge county, owned and operated by the Wisconsin Iron Company, of Milwaukee. This ore is called, geologically, an upper silurian brown hematite. At these

pany is acknowledged in the enhanced value of real estate in and about the city. Property in the vicinity of the works, which a few years ago could be purchased for fifty dollars per acre, is now, in some instances, worth a thousand; while real estate in every part of the city has advanced at least fifty per cent.

This company began operations with a capital stock of \$250,000. The business was then, and until 1870, confined to re-rolling railroad iron, and amounted to about \$250,000 a year. At this time they occupied but one building, the rail mill, 180 by 211 feet, and gave employment to only 180 men. In 1870 they greatly increased the works, and added a blast furnace, 17 feet bosh and 66 feet high. The same year

iron. A number of vessels are employed during the season of navigation in transporting this ore from Escanaba, and 140 cars are in constant use bringing ore from Iron Ridge and for use in the yards and on the dock, which is 1400 feet in length. The pile of ore now on the ground for winter use is immense, while the cars are daily bringing fresh supplies.

The fuel is mostly brought long distances. There were used at the works last year 55,000 tons of bituminous coal brought from Ohio, 25,000 tons anthracite from Pennsylvania, and 30,000 tons coke from Connellsville, Pa. The two former are brought by water and the latter by rail, obtaining cheap freightage in grain vessels and stock cars on their return trips.



FIFTEEN TON STEAM HAMMER, BY THE MARKISCHE MASCHINENBAU-ANSTALT.

mines the supply is practically inexhaustible. This locality is only some 40 or 50 miles from Milwaukee, and in direct communication with it by rail. Beside the mine above referred to, the Milwaukee iron masters obtain ores from Missouri, Lake Superior and Michigan. From the two latter sources it is freighted directly by rail, and lake vessels, to the wharves of the furnaces.

Of the several large establishments now in operation at this place, some of which I have seen described in your columns within the past few weeks, the most extensive and important is that of the Milwaukee Iron Company. This company organized under a charter obtained in 1866, and the erection of the extensive works required to carry on the business of the company gave an impetus to all the iron manufacturing interests of the city. Indeed, this may be said to have been the initial point at which commenced her prosperity as an iron producing and iron manufacturing city. With an enlightened and liberal policy, the projectors of this great establishment gave most of their contracts for the heavy iron work necessary for the rolling mills and furnaces to Milwaukee mechanics. Every foundry and engine shop was put into requisition to furnish castings, boilers and engines for them. Their works also gave employment to hundreds of other mechanics and laborers, thus greatly stimulating all local industries. Not only this, but the beneficial influence of this com-

pany was also built a new puddling mill having 19 furnaces. In the following year was built another puddling mill with 20 furnaces; and another blast furnace, similar to the first, the two side by side. Various additions were also made to the rail mill; and last year the products of the works amounted to \$3,000,000. More recently they have added a "top and bottom" mill to make flats for rails, increasing the capacity of the establishment by about 10,000 tons a year.

Of blast furnaces the company have two, both of excellent "bottom." Their dimensions are 67x17 feet, and together they ran 37,347 tons of pig metal last year—a large yield for furnaces of this size. The iron, which is made of Iron Ridge and Lake Superior ores, is said to be of extra quality for rail making purposes, when the ores are mixed in about the proportion of three-eighths of the former to five-eighths of the latter. Of the ore used at the works 22,000 tons are brought from Escanaba in vessels direct to the company's docks, and 40,000 tons from Iron Ridge on the St. Paul Railroad direct to the works. The company owns two-fifths of the Iron Ridge mines. The balance is owned by the proprietors of the Chicago mills and those at Escanaba. The ores brought from the Lake Superior country are purchased at the mines near Negaunee, and shipped in vessels from Escanaba. The company thus has the advantage of being enabled to select such ores as are best adapted to the manufacture of railroad

The machinery of the works is mostly of home manufacture, and bears the names of the various machine shops of Milwaukee. There are in all 42 steam boilers in the old mills; 2 blowing engines; 7 pairs of shears for cutting both hot and cold iron; 2 trains of puddle rolls; a train for rolling rails and 3 for tops and bottoms; saws for cutting rails, steam hammers, 6 fan blowers, 2 Burden's rotary squeezers, rail straighteners, steam punches and slotting apparatus for cutting up old rails, &c. The rail product of the establishment last year was about 35,000 tons, including those re-rolled, and of pig iron for market probably about 10,000 tons.

This company originally purchased at the location of their works, beyond the outskirts of the city, a tract of 114 acres. Fifty acres of this land was reserved for the purposes of the works, and the balance, 64 acres, was divided into lots, 50 by 150 feet, on which they erected neat and commodious cottages for their employees and their families. They are now selling these to their workmen at rates within the reach of all, and the owners put up such buildings as they choose, some of which are very tasteful and comfortable residences. The number of dwelling houses now owned by the company is 65. In addition to these there have been built by workmen and others attracted to the place 250, making the number of dwellings upward of 300. Beside these is a large boarding house, for the accommodation of those workmen who have no families. There are in the place one Methodist, one Episcopal, one Presbyterian, one Lutheran and one Catholic church, and a pleasant and commodious public hall. All the titles given for lots in this village are so worded that no person can start a saloon for the sale of intoxicating drinks within its limits.

The company has a paid up capital of \$1,500,000, and employs, beside this, \$750,000 in carry-

ing on its operations. The officers are: Captain E. B. Ward, president; Hon. Alexander Mitchell, treasurer; and J. J. Hagerman, Esq., secretary. The latter gentleman has been general manager of the business of the company since its organization, and to his well directed energy, enterprise and prudence, the company are in a great degree indebted for their financial prosperity.

## Asbestos.

A writer in the *British Trade Journal*, discussing the subject of asbestos and its uses, says of it: In the city of Glasgow a manufactory is now being carried on, in which the principal ingredient used is a material hitherto so little known, except among savants, that its very name—"asbestos," is a mystery. When all its properties are known, the substance itself is still more puzzling. In appearance as friable and perishable as thistledown, it is older than any order of animal or vegetable life on earth. So little amenable is it to the dissolving influences of time, that the action of unnumbered centuries, by which the hardest rocks known to geologists are worn away, has no appreciable effect on this strange substance, which is found imbedded in them. With its greater proportion of bulk composed of the most rough and gritty materials known, it is itself as smooth to the touch as soap or oil, and may be made as light and buoyant as feathers. Apparently as combustible as tow, the fiercest heat cannot consume it, and the threadly filaments may be mingled with molten brass or iron without losing their characteristic form. Finally, no combination of acids at present known in any way effects the appearance and strength of its fibre, even after days of exposure to their action. The name of this article is derived from the Greeks. "Asbestos" literally means from the Greeks, "a title which is very thoroughly earned by this strange substance." It is, moreover, so unassailable by all known solvents that it is a virtual impossibility to analyze and give its component parts with exactness. Enough, however, is known or guessed at, to enable us to speak of it as consisting of from fifty to sixty parts siliceous, ten to twenty parts magnesia, about the same proportion generally of aluminium, some traces of protoxide of iron, and occasionally a lime-like mixture. These proportions vary greatly in the hundreds of different varieties of asbestos known, and govern and regulate exactly its value for practical purposes. Asbestos is a mineral. It is found in nearly every part of the world, and occurs in distinct veins and seams, usually in the serpentine formation of rocks. In order to procure it, it is necessary to mine in regular form, and to work the lodes or seams by blasting and tunneling. This, in many cases, is a very costly process, as the rock in which it is found is extremely hard. The seams vary greatly in size, width, color, and general appearance in different parts of the world. In fact, no two are exactly alike, but they have almost universally the same dip and inclination. The marvelous properties and consequent prospective value of asbestos to mankind have been known to some extent and appreciated for thousands of years, and vast sums of money have been expended in endeavoring to make it available; but up till within a few years these experiments have for the most part resulted in failure, from the fact of the varied and dissimilar peculiarities of the different species—such, for instance, as the length, strength, and fineness of the fibre, excess of magnesia or aluminium, &c., being unknown. Having neither experience nor theory to guide them, the experimenters have invariably misdirected their energies by using the wrong or the unselected and unprepared species for their different works, and consequently their efforts have been unavailing. The rock upon which all have heretofore acted has been the mistaken impression that all asbestos is of the same nature. This is correct in the abstract. It is true that all asbestos is extremely refractory—insensible to the action of acids, moisture, or decay. Yet it is not true that all asbestos may be treated alike, or, if treated alike, similar results will accrue. For instance, paper can be made from asbestos, and of excellent quality too. Still there is only one ore, at the furthest, two kinds of asbestos that can be made into paper at all, and that only by proper and peculiar treatment. This also is the case as to thread and cloth, and, in fact, with reference to any and all other applications of asbestos. A new and important use for this substance is for steam packing. In this particular branch of manufacture, more than any other, is a thorough knowledge of asbestos necessary, for so destructive are the influences to which steam packing is exposed, that out of samples from more than one hundred mines in the United States, Scotland, Ireland, the Shetland Islands, Wales, Savoy, Piedmont, Germany, Austria, and Corsica, only two have been found which answered the purposes at all, and one of these only indifferently. The complex requisites in asbestos to make satisfactory packing are so numerous and peculiar that it would be tiresome to enumerate them. The manufacture of asbestos steam packing is a simple and beautiful process. The raw material is brought to the manufactory in sacks, and looks like chips and blocks of wood, but of a beautiful white color. Experiments and study have revealed the best method of disintegrating and picking apart these chips and blocks, and reducing them to a fibrous condition like flax, jute, or cotton. The material once properly opened, it is, by means of machinery, which is both simple and ingenious, formed into packing of the usual market sizes. These machines are as easily attended as weaving looms, and each is under the care of a young woman, who, after a short time, becomes expert in the business, and is capable of turning out a first-class article. It is compactly reeled up in coils as made, and, when of proper size, is securely tied, covered with bagging, and sent to all parts of the world. The practical uses to which it is not only possible but probable that asbestos will be put are almost numberless. Asbestos boats, tubs, boxes, wagon bodies, and even railway carriages, which will neither rot, burn, nor splinter, are perfectly practicable and possible.



## Metals.

**ANSONIA  
BRASS & COPPER CO.**

19 and 21 Cliff Street,

(Adjoining Office of Phelps, Dodge &amp; Co.)

Sheet Brass, Planished Brass, Meyer's Patent, Brass Seamless Scoops, Brass Wire, Hayden's Patent, Brass Kettles, Brass Tubing, Lamp Burners, Sun Burners.

Sheet Copper, Planished Copper, Copper Rivets & Burs, Braziers' & Bolt Copper, Braziers' Rivets, Copper Tubing, Copper Bottoms, Copper Wire, Iron Wire, Fence Wire.

A large variety of Wood and Bronze Case Clocks.

MANUFACTURERS AT ANSONIA, CONN.

**Phelps, Dodge & Co.,**

IMPORTERS OF

**TIN PLATE,**

Sheet Iron, Copper, Pig Tin, Wire, Zinc, etc.

MANUFACTURERS OF

**COPPER and BRASS.**

Cliff St., bet. John and Fulton,

NEW YORK.

**T. B. CODDINGTON & CO.,**

25 &amp; 27 Cliff St., New York.

Importers of

**TIN PLATES,**

And METALS of all descriptions.

**A. A. THOMSON & CO.,**

Importers and Dealers in

**Tin Plate, Sheet Iron,**

ZINC, COPPER, WIRE,

Block Tin, Spelter, Solder, &amp;c.

Nos. 213 and 215 Water and 119 Beekman Sts.,

NEW YORK.

P. O. Box, 61.

**SCOVILL MFG. CO.**

No. 4, Beekman St., New York.

MANUFACTURERS OF

SHEET AND ROLL BRASS, BRASS AND COPPER WIRE, GERMAN SILVER, BRASS BUTT HINGES, KEROSENE BURNERS, METAL BLANKS CUT TO ORDER, CLOTH AND METAL BUTTONS, in every variety.

PHOTOGRAPHIC GOODS.

AGENCIES:

4 Beekman Street, New York,  
17 Beach Street, Boston,  
137 State Street, Chicago,  
Manufactory, WATERBURY, CONN.

**Lead Pipe and Sheet Lead,**

Improved

**Tin Lined Lead Pipe,**

Block Tin Pipe, Bar Tin, Pig Tin,  
Pig Lead, Bar Lead, Solder, &c.  
Colwell Lead Company,  
No. 213 Centre Street, New York.

**EVANS & ASKIN**

BIRMINGHAM, ENGLAND,

Refiners of Nickel and Cobalt.

SOLE AGENTS,

**VAN WART & McCOY,**

43 Chambers St., New York.

Nickel and Cobalt always in stock.

**W. & J. TIEBOUT,**290 Pearl St., near Beekman,  
NEW YORK,

Manufacturers of

**CAST BRASS,  
GALVANIZED**

AND

**SHIP CHANDLERY  
HARDWARE.****CORDAGE, ROPE, etc.**D. ALLEN'S SONS, Manufacturers,  
136 Front Street, New York.**Manila and Sisal Cordage,  
JUTE ROPE.**

Send for Price List.

## Metals.

**Waterbury Brass Co.**

JOHN SHERMAN, Agent,

No. 52 Beekman Street, NEW YORK.

Mills at WATERBURY, CONN.

Sheet, Rolled and Platers' Brass,

GERMAN SILVER,

Copper, Brass and German Silver Wire,

BRASS AND COPPER TUBING,

COPPER RIVETS AND BURS,  
BRASS KETTLES,

WASH BASINS,

Door Rail, Brass Tags &amp; Step Plates.

**BENEDICT & BURNHAM MFG. CO.**

MANUFACTURERS OF

Rolled and Sheet Brass and German  
Silver, Brass, Copper and German  
Silver Wire, and Beading.

Plain and Fancy Tubing, Brass and Copper  
Rivets and Burs, Brass and German Silver  
Castings, Piano-Forte and Wrought Brass  
Butt Hinges, Coal Oil Burners, Lamps and  
Lamp Trimmings of every description, Patent  
Lamp Scissors, &c., &c.

Depots—78 Reade St., N. Y., 44 Sudbury St.,  
Boston, and 17 N. Seventh St., Philadelphia.

Capital \$400,000.

CHAS. BENEDICT, President and Treasurer.

CHAS. DICKINSON, Secretary.

**BROOKLYN****BRASS & COPPER CO.,**

JOHN DAVOL, Prest.,

No. 100 John Street, NEW YORK.

Sheet Brass, Roll Brass, German Silver, Brass Tubing, Ger. Silver Tubing, Brass Wire, Ger. Silver Wire, Brass Door Rail, Brass Rivets & Burs, Copper Tube, Braziers' Solder.

Copper Sheets, Copper Segments, Copper Circles, Copper Bolts, Copper Wire, Copper Rivets & Burs, Copper Sheathing, Copper Bottoms, Copper Rivets & Burs, Copper Tube, Braziers' Solder.

MILLS, BROOKLYN, L. I.

**Chas. J. Pope & Bro.**

202 Pearl Street, New York,

Furnace Agents for Anthracite,  
Charcoal and Scotch**PIG IRON,**

COPPER, SPELTER,

TIN, LEAD, NICKEL, BISMUTH, &amp;c.

**U. O. CRANE.**

BROKER IN

**PIG IRON & METALS,**

104 John St. New York.

**Mosselman Zinc.**Assorted widths and numbers, by case or sheet, in  
store, at lowest rate.

A. A. THOMSON &amp; CO.,

Box No. 61. 213 and 215 Water Street, N. Y.

**SOLDER.**

For Sale at lowest market rates, by

A. A. THOMSON &amp; CO.,

Box 61. 213 &amp; 215 Water Street, N. Y.

**JOHN W. QUINCY,**

98 William Street, New York,

Dealer in

AMERICAN AND FOREIGN SPELTER,  
COPPER, TIN, NICKEL,

And Metals generally.

**CRAGIN BROS. & CO.**Plumbers' Materials and House  
Furnishing Goods,

141, 143 &amp; 145 Lake Street, CHICAGO.

AGENTS IRON CLAD MILK CAN CO.

**P. W. GALLAUDET.**

Banker and Note Broker,

Nos. 3 and 5 Wall Street,  
NEW YORK.HARDWARE, METAL, IRON, RUBBER, SHOE,  
PAPER AND PAPER-HANGINGS, LUMBER, COAL,  
AND FALLOUT PAPER WANTED.ADVANCES MADE ON BUSINESS PAPER AND  
OTHER SECURITIES.

## Metals.

**The Plume & Atwood  
Mfg. Company,**

MANUFACTURERS OF

**SHEET and ROLL BRASS and WIRE,**

German Silver and Gilding Metal,

Copper Rivets and Burs,

Kerosene Burners,

Shoe Eyelets, Lamp Trimmings, &amp;c.

80 Chambers Street, New York.

8 S. Market Street, Boston.

Rolling Mills, Factories,

THOMASTON, CT. WATERBURY, CT.

**Coe Brass Mfg. Co.,**

WOLCOTTVILLE, CONN.,

MANUFACTURERS OF

**HIGH AND LOW BRASS,**

Gilding Metal,

COPPER and GERMAN SILVER,

In Sheets and Rolls.

Brass, Copper &amp; German Silver

Wire,

COPPER RIVETS &amp; BURS,

BRASS, IRON &amp; BRAZIER'S RIVETS.

A specialty made of

BRASS &amp; GILDING METAL

For Metallic Cartridges.

**MAX HARNICKELL,****Broker in Metals,**

85 Beaver Street,

NEW YORK.

Advances made on Consignments.

**TIN PLATE**

and

**PIG TIN,**

In Store and For Sale by

**A. A. THOMSON & CO.**

213 &amp; 215 Water St., NEW YORK.

**Fuller, Dana & Fitz,**

IMPORTERS AND COMMISSION MERCHANTS,

BOSTON, . . . 110 North Street.

Tin Plates, Sheet Iron, Metals, Iron, Steel, Etc.

Wrought Iron Beams &c., for Buildings.  
Exclusive Boston Agents for the sale of Morris, Tasker  
& Co.'s Lap Welded Boiler Tubes. Patent Cold Rolled  
Shaffing. The "Borden Best" Iron. Flexible Strength 8-  
and 10-lbs. The celebrated Bessemer Steel. Brown's Original  
Concord Axes. The Salem Lead Co.'s Lead Pipe.  
SWEDISH, NORWAY, ENGLISH, AMERICAN  
AND SCOTCH IRON. RUSSIA SHEET IRON.

FULLER, DANA &amp; FITZ'S Price List on application.

**A. R. ANDREWS & CO.,**

Manufacturers of and Dealers in

**WIRE GOODS**

Of every description.

No. 89 1-2 ASYLUM STREET,

HARTFORD, CONN.

Price list sent on application.

**New Haven Wire Co**

MANUFACTURERS OF

**MARKET,**

TELEGRAPH,

FENCE,

and all kinds

IRON WIRE.

New Haven, CONN.

**IRON AND STEEL WIRE ROPE,**

MANUFACTURED BY

JOHN A. ROEBLING'S SONS,  
TRENTON, N. J.

FOR

INCLINED PLANES, MINING,  
STANDING SHIP RIGGING,  
SUSPENSION BRIDGES, FERRIES,STAYS AND GUYS ON DERRICKS,  
CRANES & SHEARS, ELEVATORS,  
TILLES, &c.A large stock of Wire Rope constantly on hand.  
Orders filled with dispatch.For strength, size and cost see circular,  
which will be sent on application.

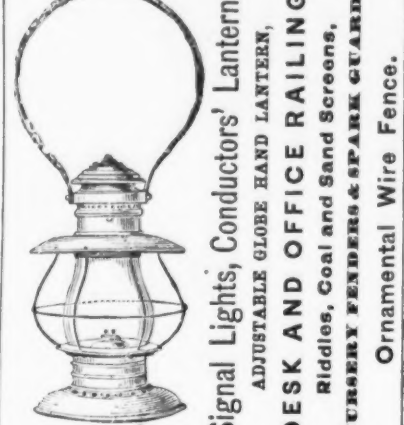
## Wire, etc.

**National Wire and Lantern  
Works.**

Warehouse, 45 Fulton St., New York

**HOWARD & MORSE,**

MANUFACTURERS OF

**BRASS, COPPER AND IRON  
WIRE CLOTH,**LOCOMOTIVE  
Spark Wire Cloth,  
IRON WIRE  
BOLTING CLOTH,  
Square Wire Sheet Cloth.**Ship and Railroad Lanterns,**Signal Lights, Conductors' Lanterns,  
ADJUSTABLE GLOBE HAND LANTERN,  
DESK AND OFFICE RAILING  
Riddles, Coal and Sand Screens,  
SURGEY FENDERS & SPARK GUARDS  
Ornamental Wire Fence.**GILBERT, BENNETT & CO.,**

GEORGETOWN, CONN.,

MANUFACTURERS OF

**Iron Wire, Curled Hair & Glue,**

Brass, Tinned and Iron Wire Sieves, Coal, Oat  
and Hair Sieves, Hair and Wire Gravy Sieves,  
Brass and Iron Riddles, Brass and Iron  
Wire Cloth, Cheese Sifters, Coal and  
Sand Screens, Wire Ox Muzzles.

Also Painted Screen Wire Cloth.

Wood Handle Shoe Cover Lifters, Coal Hods  
Pressed and Patent Cast Shovels, Shoe  
Scrapers and Pokers, Galvanized  
Conductor Strainers.

GILBERT'S RIVAL ASH SIEVE.

BLOOD'S PATENT FLOUR SIEVE.

Warehouse, 273 Pearl Street

NEW YORK.

All kinds of Galvanizing done expeditiously, and on  
reasonable terms.

The highest price paid for Cattle's Tails and Hog's Hair.

MANUFACTURERS OF THE

**UNION METALLIC CLOTHES LINE  
WIRE,**

the best in use. Agents wanted.

**HAMILTON & RAINEAR'S**

Philadelphia Wire Works.

Manufacturers of

**WIRE**

Of every description. A specialty is made of

Charcoal Iron and Bessemer Steel

**SPRING WIRE.**

No. 1716, 1718, 1720 North 5th Street,

PHILADELPHIA, PA.

**HOWE, BIGELOW & CO.,**

MANUFACTURERS OF

**PLAIN and FANCY WIRE GOODS,**

Dish Covers, Corn Poppers, &amp;c.,

129 Main St., Worcester, Mass.

Illustrated Catalogue sent free on application.

**Chicago National Wire Cloth Mill,**

30 TO 48 DILLER STREET.

EVANS &amp; CO., Proprietors,

OFFICE, 281 MADISON STREET, CHICAGO, ILL.

**CRIMPED LOCOMOTIVE SPARK CLOTH**

A SPECIALTY.

Price and Weight per Square Foot, by the Roll. For Steel Wire, add 7%

3 x 3 MESH.		3 1/2 x 3 1/2 MESH.		4 x 4 MESH.		6 x 6 MESH.		8 x 8 MESH.		10 x 10 MESH.	
No. of Wire	Wt. per sq. foot	No. of Wire	Wt. per sq. foot	No. of Wire	Wt. per sq. foot	No. of Wire	Wt. per sq. foot	No. of Wire	Wt. per sq. foot	No. of Wire	Wt. per sq. foot
10	3.47	40	11	3.20	38	12	2.89	35	14	2.43	33
11	2.75	32	12	2.45	31	13	2.15	30	15	1.97	30
12	2.10	26	13	1.85	25	14	1.62	25	16	1.51	25
13	1.61	22	14	1.41	20	15	1.31	21	17	1.10	20

These Cloths are used for Mines, Jail, Asylum, and Storehouse Window and Door Guards, Malt Floors,  
Bulkheads and Floors for Grain Elevators and Grain Vessels. SPECIAL FIGURES FOR LARGE ORDERS.

## Wire, etc.

**Washburn & Moen Mfg. Company,**

WORCESTER, MASS.

Established 1881.

PHILIP L. MOEN, Pres. Wm. E. RICE, Treas.  
CHAS. F. WASHBURN, Sec'y

MANUFACTURERS OF

**IRON AND STEEL WIRE.**

WIRE RODS of all Grades; Round Iron, Rivet quality,  
3-16 in. to 1/2 in., cut to any length.  
Owners and exclusive Operators of the

**PATENT CONTINUOUS MILL,**Producing Iron and Steel WIRE, in coils of 100 pounds,  
without SEAM or WELD.Plain and Patent Galvanized Tele-  
graph Wire,Market and Stone Wire, Annealed Fence and Grape  
Wire in long lengths; Coppered Rail-Ball Wire; Rope,  
Bridge, Bolt, Screw, Rivet, Buckle and Chain Wire. Wire  
for the manufacture of Card Clothing, Saddles, Beds,  
&c. Piano-string Covering Wire, Tinned Broom Wire  
and Tinned-plated Wire of all sizes. A specialty is made  
of Clock, Machinery, Gun Screw and Spiral Spring Wire,  
and Reined Wire to Pattern for particular purposes,  
from selected stamps of Norway Iron. Any grade of  
Wire furnished, Annealed, Bright, Polished, Coppered,  
Galvanized or Tin Plated. Wire furnished, Straightened  
and Cut to any length.

Steel Crinoline Wire, Patent Lign finish.

Unrivaled Steel Music Wire.

Steel Wire for Springs, Needles and Drills. Market  
Steel Wire kept in stock, all sizes.

Warehouse, 43 Cliff Street, NEW YORK.

**SAMUEL PARKER & CO.,**

Wethersfield, Conn.

Manufacturers of

Brass, Copper &amp; Iron Wire Cloth,

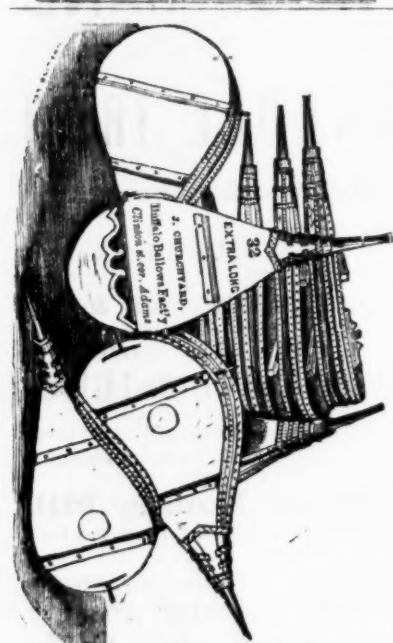
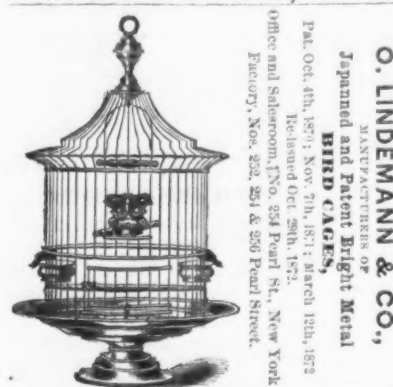
Locomotive Spark Wire Cloth,



# **UNION EYELET CO.,** PROVIDENCE, R. I. MANUFACTURERS OF **EYELETS,** of every description.

B. Long, Suspenders,  
A. B. 14, Bustle,  
F. P. 1, Skirt,  
Extra B. Long, Stationer's,  
Tag, A.,  
Corset, B. &c., &c.

All orders should be addressed to  
**Howard, Sanger & Co.,**  
Selling Agents,  
105 & 107 Chambers St., N. Y.



**Buffalo Bellows Factory.**  
MERCHANTS WILL FIND IT ADVANTAGEOUS to buy from me, as I sell low, and my location enables me to ship at very low rates. No charge for cartage or other incidental expenses, my quotation being the whole cost to the purchaser, except the freight from Buffalo to his location. Please send your orders to  
**JOSEPH CHURCHYARD,**  
Clinton cor. Adams Street, Buffalo, N. Y.

**T. C. RICHARDS & CO.,**  
47 Murray Street, N. Y.

Manufacturers of Richards' Patent Porcelain-head Picture Nails; also, Porcelain Picture, Drawer, Shutter, and Door Knobs, etc., etc.  
Importers of German Brass Goods, also, China, Gilt, Steel, and Silver Furniture Nails Wire Nails etc., etc.  
We particularly invite the attention of large buyers to our Patent Picture Nails and Knobs being a specialty with us, we offer satisfactory discounts on good orders.



**ROMER & CO.,**  
Established 1837.  
Manufacturers of Patent Brass Pad Locks for Railroads and Switches. Also, Patent Stationary R. R. Car Door Locks. Patent Plan and Sewing Machine Locks.  
141 to 145 Railroad Avenue, NEWARK, N. J.  
Illustrated Catalogues sent on application.

# **Protect Your Buildings.** Which may be done with less than quarter the usual expense, by the use of **GLINE'S PATENT** **Slate Roofing Paint.**

A roof may be covered with a very cheap shingle, and by the application of this paint be made to last from 25 to 30 years. Old roofs can be patched and coated and made to look much better and last longer than new shingles without the slate, for  
**One-Third the Cost of Re-Shingling.**  
The cost of slating new shingles is only about the cost of simply laying them, and the Slate is PERFECTLY waterproof against sparks and live coals falling upon it, as may be easily tested by any one, and as appears from the fact that Insurance Companies make the same Tariff that they do for Slated Roofs.  
For tin and iron it has no equal, as it expands by heat and contracts by cold, and never cracks or scales. For cemetery fences it is particularly adapted, as it will not corrode in the most exposed places. Roofs covered with Tar Sheathing felt can be made water tight at a small expense.  
The Slate or Paint is **EXTREMELY CHEAP:** Two gallons will cover a hundred square feet of shingle roof, or over four hundred of tin or iron. Price of the Slate ready for use is 80 cents per gallon, \$16 per half barrel, or \$20 per barrel of about 40 gallons, with a liberal discount to the trade. We furnish and apply the material for \$2.50 per 100 square feet, in the vicinity of New York.  
We use no Tar in this Composition, therefore it does not affect the water of the roof, if turned off for the first one of two rains.  
The Paint has a very heavy body, but is easily applied with a 4 or 6 inch coloring brush.  
On old rotten shingles it fills up the holes and pores, hardens them, and gives a new and substantial roof that will last for years. On curled or warped shingles it brings them to their place and keeps them there. It fills up the holes in Tin or Felting Irons, and stops the leaks; one coat is equal to ten of ordinary paint.  
The color of the slate when first applied is of a dark purple, and in about a month it changes to a light uniform slate color.  
And is to all intents and purposes Slate.  
It is a slow dryer, but rain will not affect it in the least in one hour after it is put on.  
Samples sent to any part of the country by Express, C. O. D., at the following prices: If ordered to be sent by freight, the money must accompany the order.  
1 Gallon and Can..... \$1.50  
2 Gallons and Can..... 2.50  
3 Gallons and Can..... 3.50  
10 Gallons and Can..... 9.50  
15 Gallons and Can..... 13.50  
20 Gallons and Can..... 16.00  
40 Gallons and Can..... 30.00  
Roofs examined, estimates of cost given, and when required, will be put in thorough repair. Orders respectfully solicited.  
Agents wanted in every town.  
For full information, recommends from Insurance Companies and others. Editorials from the leading Newspapers, or a sample Shingle coated with the slate, addressed to  
**N. Y. Slate Roofing Co.,**  
No. 6 Cedar St., New York City.

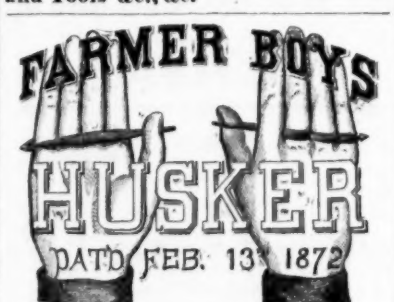
**OHIO COAL HOD COMPANY.**  
MARKLAND'S PATENT ALL WOOD BOTTOM  
**COAL HOD,**



**437 East Front St., Cincinnati, O.**  
These Hods are far superior to the old style of All Iron Hod, as the bottom and foot is made of one piece of light and tough wood, which will not rust, split, break, or become rangled in the foot or rim, like the old style; and there is no danger of the bottom of punching holes through or knocking the bottom out. With ordinary care, we will guarantee the GALVANIZED All Wood Bottom Hod to last five years. Have known them to last seven years, and still remain in use.



**OILERS! OILERS!**  
**J. H. WHITE, Newark, N. J.,**  
MANUFACTURER OF  
Olmsted Patent and Common Oilers,  
of all descriptions.  
Colwell Patent Door Spring Children's Carriage Trimmings, Spun and Stamped Brass for all Trades, Dies and Tools &c., &c.



This is a common sense Husking Pin, made of Cast Steel or Malleable Iron, secured to the handle in a new and an improved manner, making it the best Husker in the market. Price List and Circular free. Address  
**PARKS BROS., Manufacturers,**  
PRINCETON, Ills.

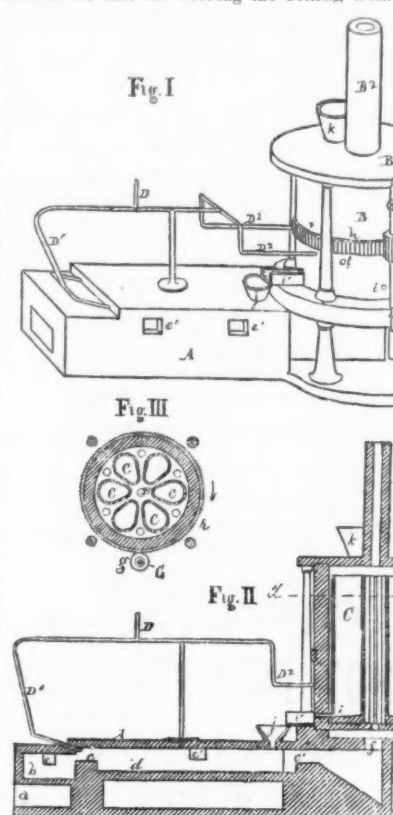
**Wilson Bohannon,**  
Manufacturer of Patent  
**Brass Spring Pad Locks**



**Railroad Switches,**  
Freight Cars, &c.  
Cor. Broadway & Kossuth St.,  
Brooklyn, E. D. N. Y.  
F. C. HUCHTHAUSEN,  
Special Partner.

**New Patents.**  
We take from the records of the patent office at Washington the following specifications of certain patents lately issued, which will be found interesting:  
**IMPROVEMENT IN COMBINED ROTARY BLAST AND PUDDLING FURNACES FOR MAKING WROUGHT IRON DIRECT FROM THE ORE.**  
Specification forming part of Letters Patent No. 138,429, dated April 29, 1873, issued to John Neville, of Jersey City.  
Figure 1 is a perspective view; Fig. 2 a central longitudinal vertical section; Fig. 3 a cross section of the rotary blast furnace at x x in Fig. 2.  
This invention relates to a combined blast and puddling furnace designed for making puddled iron direct from the ore, the ore being smelted by the waste heat of the puddling furnace, the process being continuous; also, to the employment of superheated steam in the smelting process for deoxidizing the ore, the object being to produce a superior quality of metal, with a saving of the cost of the fuel used heretofore in smelting the ore; and to this end it consists in the combination of a peculiarly constructed rotary blast or smelting furnace with a puddling furnace, and in the employment, in connection therewith, of superheated steam, in the manner and for the purposes more fully hereinafter set forth.  
In the drawing, A represents the walls of an ordinary puddling furnace, in which a is the ash-pit; b, the fire-place; c, the bridge-wall; d, the hearth; e, the back bridge-wall; e, the door for charging the fire-place; and e', the door in the side for working the boiler iron.

pose of deoxidizing the ore by its affinity for the hydrogen of the steam.  
**Claim**—1. The rotary stack B containing ore retorts C, in combination with a puddling furnace, when the reduction of the ore in the said retorts is effected by the waste heat of the puddling furnace, as described.  
2. The arrangement of the pipes D D' with relation to the stack B and retorts C for supplying superheated steam thereto, substantially as described and shown.  
**IMPROVEMENT IN THE MANUFACTURE OF MANGANESE, FERRO-MANGANESE AND SPIEGELEISEN.**  
Specification forming part of Letters Patent No. 141,419, dated August 5, 1873; issued to Ogden Bolton, Jr., of Pittsburgh.  
The articles known as ferro-manganese and spiegeleisen are extensively used in the manufacture of steel and the higher qualities of wrought iron, and the ferro-manganese, as heretofore prepared, has been made chiefly by melting manganese, pulverized carbons, and pig iron or spiegeleisen, while the spiegeleisen is made chiefly in the blast furnace.  
By this improvement the inventor claims to produce the manganese in a condition pure, or nearly so, without melting, and employ it in the making of ferro-manganese and spiegeleisen in the manner presently to be described, so as to produce a better quality of product in less time and at less expense than by the processes heretofore in use.  
The process is as follows: Take of the ordinary oxide of manganese about ten parts, by weight, to three parts of solid carbon, such as charcoal, coke, or anthracite coal, or the equivalent thereof of gaseous carbon. Both these ingredients are preferably pulverized, and when mixed thoroughly are enclosed in cases or boxes of suitable material, either metallic, or made of silicious or aluminous earths. These cases, or boxes, may be of any suitable size for containing any desired charge. They are preferably made close, except at one end, where the charge is introduced, and which is subsequently closed with a covering of charcoal, clay, or other like substances, such as will permit the escape of the gases evolved in the process of reduction, but which will prevent the entrance of atmospheric air in injurious quantities.  
Instead of this covering of charcoal and clay, a loose metallic sheet may be advantageously employed with a sand covering around the edges, in which case, as the bulk of the charge lessens in the process of reduction, the loose plate will follow it down. These boxes, or cases, are then charged into any suitable heating furnace, such, for example, as the ordinary reverberatory furnace, and are there raised to temperature less than melting heat—say, a bright red or bare yellow—and after the contents are well heated through they are continued subject to this heat for about from twelve to fifteen hours, according to the quantity. The manganese employed in this process may be either protoxide or peroxide. In the process described the carbon unites with the oxygen and passes off as carbonic-acid gas or carbonic oxide, and gives as a product manganese nearly or quite pure.  
The product thus obtained is employed to secure spiegeleisen or ferro-manganese, in the following manner: Melt the pig iron in the ordinary way, but, preferably, in a reverberatory furnace, and charge into it about twelve per cent. of the manganese produced, as above, and melt the manganese therein. Where the manganese is reduced in metallic cases it may be charged into the molten metal in the box either hot or cold; or it may be compressed into lumps or blooms of convenient size for handling, and charged in that form into the molten pig metal. This proportion of ingredients is run off, when melted, into ingots as spiegeleisen, or tapped directly into the Bessemer converter or open hearth, where it is used as spiegeleisen, in the ordinary way.  
To produce ferro-manganese charge into the molten pig metal a larger proportion of manganese, such as will give in the molten product the desired percentage of manganese—say, twenty-five or thirty per cent., more or less—and run off into ingots or tap off into the converter or open hearth the molten product, as before specified. But, if so preferred, the pig metal and reduced manganese may, in the proportions above indicated, be melted together in the reverberatory furnace, though less advantageously.  
The manganese, as produced by the process first described, is used advantageously by charging the same while inclosed in its case or box; or, when compressed into blooms, directly into the molten steel of the Bessemer converter or the open hearth. The manganese counteracts red-shortness in the steel, apparently by uniting with the free oxygen or metallic oxides which may be in the steel, and in this mode of using it is particularly useful in the manufacture of boiler plate steel. From one-half to one per cent. of manganese will ordinarily give the best results in this use.  
**Claim** 1. The reduction of manganese in close boxes, or cases, in a suitable furnace at less than a melting heat, with or without the introduction of iron.  
2. The manufacture of spiegeleisen and ferro-manganese by charging the unmelted, or metallic, manganese produced, as set forth, either in boxes or in blooms, into pig metal previous to or after melting.  
3. The charging of metallic manganese, either in cases, or blooms, into a bath of molten steel, substantially in the manner set forth.



**IMPROVED FURNACE FOR MAKING WROUGHT IRON DIRECT FROM THE ORE.**

f is the flue opening in the back end of the furnace, discharging the waste heat into the center of a cylindrical stack, B, mounted on a foundation of suitable construction, on which it is rotated by the action of a vertical shaft driven by an engine or other motor, and provided with a pinion, g, which meshes with a geared ring, h, bolted around the stack about mid-height. The cover B' of the stack does not revolve, but is supported on the encircling columns, as shown, and from its center a chimney, B'', rises. Within the rotary stack are placed six or more retorts or smelting chambers, C, egg shaped in cross section, and open at the top, with a tap hole, i, at the lower end of each. i is a stationary spout in the lower part of the stack on the plane of the tap holes in the several retorts, and discharges through a hopper, j, into the puddling furnace. k is a hopper in the top or cover B', through which the retorts are successively charged with pulverized iron ore and carbon. l are openings in the revolving stack on the same plane and equidistant from each other, each opening leading into a retort in the manner of a tuiere. D is a steam pipe conveying steam from a generator and superheater, and is branched over the furnace. One branch, D', is again divided and inserted diagonally through the upper part of the furnace in such a manner that the several jets will issue in the direction of the back edge of the bridge-wall, mingling with the flames and gases of the fuel. Around each nozzle an annular space is left in the furnace wall, through which air is drawn by the inflowing steam jets, which, mingling with the gases and superheated steam, ignites the gases and produces a perfect combustion and correspondingly high temperature in the furnace. A second branch, D'', of the steam pipe is led toward the stack, where it is again subdivided, each jet or nozzle being coincident with one of the openings l in the stack, so that a volume of superheated steam is being continually blown into two of the retorts, which present themselves to the nozzles, while the retort between these two is tapped and the fluid metal contained is being run into the puddling furnace. During this time the empty retort beyond is being charged with pulverized ore and carbon, and, as before stated, the ore is smelted by the waste heat of the puddling furnace.  
The stack and retorts are so arranged that while one retort is being charged another is being tapped, and two or more others are being charged with superheated steam for the pur-

**IMPROVEMENT IN ALLOYS OF NICKEL, ZINC AND COPPER.**  
Specification forming part of Letters Patent No. 141,530, dated August 5, 1873; issued to Howell W. Wright, of Glastenbury, Connecticut.  
This alloy consists of American commercial nickel (which contains about twenty-five per centum of copper) and zinc in about the proportion of one hundred pounds of zinc to from twenty-five to thirty-four pounds of the American commercial nickel.  
The nickel is improved for the purposes of this alloy by a preliminary process of refining, as follows: Take, say, one hundred pounds of the nickel, melt it and continue the heat till the nickel bubbles. If the melted nickel shows traces of dirt, cobalt, or iron, add about two ounces of soda-ash as a flux and stir till the nickel boils or bubbles in the center. If the nickel shows cobalt in excess, add about two ounces of nitrate of soda as a flux, and stir till the nickel boils or bubbles in the center. If the nickel shows arsenic, common salt in same quantity may be used as a flux. If the nickel shows sulphur, carbonate of soda in about the same quantity may be used as a flux. The nickel may now be cast into sheets, and is now refined and purified.  
The alloy is to be produced by melting the zinc in any proper manner, as in a crucible, keeping the zinc covered meanwhile with powdered charcoal or other equivalent carbonaceous matter. The heat is continued after the zinc is melted under the cover of the charcoal. When raised to a trifle above the melting point of copper the nickel is added in small strips or pieces, and the heat continued till the whole is melted; the melting metal being kept covered all the while with the powdered charcoal, and when melted the alloy is cast into ingots, the charcoal flowing out with the alloy and forming a coating on the ingot. The whole is allowed to cool together.  
This alloy is specially useful in making German silver. By remelting this alloy under charcoal as before, and adding copper till the per centum of nickel is reduced to anywhere from one to twelve per centum of the whole, a good German silver may be formed, the richness of the metal varying with the per centum of the nickel.  
This alloy, when added to any metallic compound containing copper, bleaches, whitens, and strengthens it.  
Common pin metal is usually composed of two parts of copper to one of zinc. By adding this alloy till there is a full quarter more of zinc in the composition, a cheaper article and, at the same time, a better one may be produced.  
**Claim**—An alloy of copper, nickel, and zinc, in about the proportions specified.

**Vapor Power.**  
The Boston Globe says: Mr. William Wells, of Salem, has just perfected an apparatus for running stationary or locomotive engines by vapor power, which, if it fulfills all that is expected of it, will entirely revolutionize the method of running engines of every description. The new apparatus was set up a few days ago, and put in practical operation for the first time, in the presence of several gentlemen well versed in machinery and the application of power. The working of the engine was entirely satisfactory, and all present expressed themselves as highly pleased with the success of the invention, which has been considered by all but the designer as an experiment.  
The whole apparatus is very simple in construction, and the new power can be applied to any engine. The whole peculiarity in construction is in the boiler, the vapor being conveyed to the cylinder of the engine just the same as steam. The boiler is an upright one, and is really a double boiler; that is, it has two heads at each end, one a few inches from the other. The two chambers thus formed, one at each end of the boiler, are filled with water, and are connected by tubes, which are for the circulation of the water between the two chambers. The second or inner boiler, that between the two inner heads, is filled with a preparation of bisulphide of carbon, the vapor from which is the motive power and takes the place of steam. Beneath the boiler is a small fire box, from which flues run up through the two boilers to the smoke pipe. These flues pass inside of the tubes already mentioned, and the fire in passing through heats the chemicals. By this arrangement it will be seen that the bisulphide in the inner boiler receives the requisite amount of heat without coming in direct contact with the fire flues, as the water, as has been explained, is kept in circulation through the tubes. Mr. Wells claims that with a comparatively small fire a great amount of power can be obtained, and it has been practically shown that with the water at a temperature of 212 degrees Fahrenheit, or the boiling point, a pressure of sixty-five pounds to the square inch is obtained on the vapor boiler, and, of course, if a greater heat is applied to the water, the vapor pressure will increase proportionally. It should be mentioned that the chemical preparation is used over many times, as the vapor, after passing through the cylinder of the engine, passes into a condenser, and is then returned to the boiler to be used again. The waste of chemical material is said to be very small. It is estimated that at least two-thirds of the amount of fuel can be saved by the use of this invention, but the exact amount can be better determined after further experiment. Mr. Wells has been at work eight years in perfecting this apparatus, and, judging from the recent test, his labors and pains have not been thrown away. The engine is to be put in daily use at the planing mill of David Bullard, on Front street, Salem, in a short time, and all interested can have an opportunity to judge of the merits of this invention for themselves.

**Gilding on Iron.**—An improved method of gilding on iron and similar metals has been introduced by Herr W. Kirchmann. The surface of the metal, even when oxidized, may be prepared by treatment with sodium amalgam; chloride of gold is then poured over the amalgamated surface, and by application of heat the mercury may be expelled, leaving a uniform film of gold capable of receiving a polish.



**Iron.**  
NEW YORK.  
**GAM'L G. SMITH & CO.,**  
**IRON WAREHOUSE,**  
342, 344 & 346 Pearl Street, New York.  
Importers and Dealers in  
**IRON STEEL,**  
COMMON AND REFINED IRON,  
SHEET AND PLATE IRON,  
Rod, Hoop, Band, Scroll, Horse Shoe,  
Angle and Tee Iron,  
**PIG IRON,**  
**OLD RAILS,**  
WROUGHT IRON BEAMS.  
Iron of all sizes and shapes made to order.

**PIERSONS & CO.**  
Iron Warehouse,  
24 Broadway, 77 & 79 New St.,  
NEW YORK CITY.  
**IRON and STEEL,**  
Common and Refined Iron Rods,  
Hoops, Bands, Scrolls, Horse Shoe,  
Ovals, &c., &c.  
Swedes, Norway, Lowmoor & Bagnalls.  
Orders filled from stock at lowest prices.

**JACKSON & CHACE,**  
206 & 208 Franklin St., N. Y.  
Importers and Dealers in  
**IRON and STEEL.**  
Agents for  
JOHN A. GRISWOLD & CO'S  
Bessemer Steel.  
Agents for  
UNION IRON MILLS,  
Wrought Iron  
Beams,  
ANGLE and T IRON.  
Special Irons for Bridge and  
Architectural Work.

**ABEEL BROTHERS,**  
Successors to JOHN H. ABEEL & CO.,  
**Iron Merchants,**  
190 South Street and 365 Water, N. Y.  
**ULSTER IRON**  
A full assortment of all sizes constantly on hand.  
English and American Refined Iron  
of choicest brands.  
Common Iron.  
Band, Hoop and Scroll Iron.  
Sheet Iron.  
Norway Nail Rods.  
Norway Shapes.  
Cast, Spring and Tire Steel, etc.

**Alfred R. Whitney,**  
Importer and Dealer in  
**IRON STEEL,**  
Well assorted stock of  
**Angle and T Iron,**  
To 36 feet in length, constantly on hand.  
56, 58 & 60 Hudson, and 49, 51 & 53 Thomas Sts., N. Y.  
English and American Manufacturers'  
**AGENT FOR IRON**  
Used in Construction of  
Fire-Proof Buildings, Bridges, &c.  
Books containing Cuts of all iron now made, sent by  
mail. Sample Pieces at office.  
Please address 58 Hudson Street.

**BORDEN & LOVELL,**  
**Commission Merchants**  
70 & 71 West St.,  
New York.

Wm. Borden,  
L. N. Lovell,  
Agents for the sale of  
**Fall River Iron Co.'s Nails,**  
Bands, Hoops & Rods,  
AND  
**Borden Mining Company's**  
**Cumberland Coals.**

**A. B. Warner & Son,**  
**IRON MERCHANTS,**  
28 & 29 West and 52 Washington Sts.  
**BOILER PLATE,**

Boiler Tubes, Angle, Tee & Girder Iron,  
Boiler and Tank Rivets.  
Sole Agents for the celebrated  
**"Eureka,"** Pennocks,  
**"Wawasset,"** Lukens,  
Brands of Iron. Also all descriptions of Plate, Sheet,  
and Gasometer Iron. Special attention to Locomotive  
Iron. Fire Box Iron a specialty.

**IRON, NAILS, NUTS WASHERS, AND CAR-**  
**RIAGE BOLTS.**  
**PACKARD, GOFF & CO.,**  
Jobbers of  
Iron, Nails, Nuts, Washers, and Carriage Bolts.  
**YOUNGSTOWN, O.**  
We have three Rolling Mills, a Nut and Bolt Factory  
located here. Orders solicited.

**Iron.**  
NEW YORK.  
**Conklin & Huerstel,**  
Successors to M. W. DEAN,  
**"IRON MERCHANTS,"**  
99 Market Slip, N. Y.  
Keep constantly on hand a full assortment of  
English and American Refined Iron,  
COMMON IRON,  
Band, Hoop and Scroll Iron,  
Norway Nail Rods and Shapes,  
Cast, Spring, Toe Calk and  
Tire Steel.  
Goods Shipped free of Cartage.

**WM. GARDNER,**  
575 Grand, 414 Madison & 309 Monroe Sts.  
**Bar, Hoop, Rod, Band and**  
**Horse Shoe Iron.**  
AGENT FOR  
Best Norway N. R. & Shapes,  
Spring, Toe Calk, Tire & Sleigh Shoe Steel.

**POWERVILLE**  
**ROLLING MILL,**  
JOHN LEONARD, Proprietor,  
450 & 451 West Street, NEW YORK.  
Manufacturer of all sizes of **MERCHANT**  
**IRON and HOOPS.** Also Manufacturer of  
Best Charcoal Scrap Blooms.  
And Dealer in Old and New Iron,  
Steam Engines, Boilers and Tanks.

**GILEAD A. SMITH & CO.,**  
Bartholomew House, Bank, No. 30 Pine St., N. Y.  
London. P. O. Box No. 5070.  
**RAIL ROAD IRON**  
In Ports of New York & New Orleans.  
Steel Rails of most approved Makers.  
Importers of Old Iron Rails for re-rolling.  
Bills of Exchange on Imperial Bank, London.

**Edward Page & Co.,**  
(Successors to Frykberg & Co.,)  
Swedish & Norway Iron,  
Boston Rolling Mill,  
SHAPES, NAIL RODS AND  
WIRE RODS,  
**OFFICES:**  
17 Batterymarch Street, BOSTON,  
22 William Street, NEW YORK,  
205 1-2 Walnut Street, PHILA.  
GOTHENBURG, SWEDEN.

**Marshall Lefferts, Jr.,**  
94 Beekman St., New York,  
MANUFACTURER OF  
**AMERICAN**  
**Galvanized Sheet Irons**  
AND AGENT FOR THE  
Easton Sheet Iron Works, Easton Pa.  
MANUFACTURER OF  
Best Bloom, Charcoal & Refined Sheet Iron.  
Galvanized Telegraph and Fence Wire  
Galvanized and Tinned Roofing and Siding  
Nails.  
Galvanized Ten Kettles.  
Galvanized Hoop Iron of all widths.  
Galvanized Staples.  
Corrugated Iron for Roofing, plain or gal'd.  
Galvanized Bars and Chains for Cemetery  
Railing.

**T. B. CODDINGTON & CO.,**  
25 & 27 Cliff St., New York.  
**Bar Iron, Sheet Iron, &c**  
Of every description

  
Wrought Iron Buildings, Corrugated Iron Bridges,  
Roof Shuttles, Doors, Flooring, &c. Corrugated  
Sheets of all sizes manufactured by Moseley Iron  
Bridge & Roof Co., No. 6 Day St., N. Y.

**Iron.**  
NEW YORK.  
**HAZARD & JONES,**  
BROKERS.  
**NEW & OLD RAILS,**  
FOREIGN AND DOMESTIC  
**Pig Iron,**  
Wrought & Cast Scrap Iron, &c.,  
212 Pearl St., New York.

  
**Geo. A. Boynton**  
**BROKER IN IRON**  
70 WALL ST. N.Y.

**WILLIAM H. PETIT,**  
**BROKER IN IRON,**  
72 Wall Street, N. Y.

**JAMES WILLIAMSON & CO.,**  
SCOTCH AND AMERICAN  
**PIG IRON,**  
No. 69 Wall St., New York.

**B. F. JUDSON,**  
SCOTCH AND AMERICAN  
**PIG IRON,**  
Wrought and Cast Scrap Iron.  
457 and 459 WATER STREET,  
And 235 SOUTH STREET, near Pike,  
NEW YORK.

**JOHN W. QUINCY,**  
98 William Street, New York  
Dealer in  
Anthracite & Charcoal Pig Irons,  
OLD SCRAP and CUT NAILS.  
Gibbs' Patent Lock Nut and Washer, and  
Fish Plates for Rail Roads.

**BOONTON**  
**CUT NAILS,**  
**HOT PRESSED NUTS,**  
Machine Forged Bolts,  
Washers.  
**Fuller, Lord & Co.,**  
BOONTON IRON WORKS,  
139 Greenwich Street, New York.

**Swedish Iron.**  
A Variety of Brands, including  
  
BARS suitable for Steel of all grades, Wire, Shov-  
els, Hoes, Scythes, Carriage Bolts, Nail Rods,  
Tracks, etc.  
CHARCOAL PIG IRON for Bessemer and  
Cast Iron.  
MUCK BARS for Steel Smelting and Re-rolling.  
SCRAP or BAR ENDS.  
Direct Agency for N. M. HÖGLUND, of  
Stockholm, represented in the United States by  
**NILS MITANDER,**  
69 William St., New York.

**DANIEL W. RICHARDS & CO.,**  
Importers of and Dealers in  
**SCRAP IRON,**  
**Pig Iron,**  
**OLD METALS.**  
YARDS:  
88 to 104 Mangin St., Foot of Stanton St., E. R.  
71 to 79 Tompkins St., NEW YORK.  
OFFICES:  
90 & 92 Mangin Street, New York.  
178 Pearl Street, New York.  
30 The Albany, Liverpool, England.

**THE BUSHONG**  
**Pig Iron,**  
MANUFACTURED BY  
BUSHONG & CO., Reading, PA.  
A Supply on Iron Dock, Hoboken.  
H. D. BENJAMIN, Agent,  
31 Beekman St., 2nd Floor, front, NEW YORK.

**The Corrugated Metal Co.**  
D. F. Towner, East Berlin, Ct. G. W. Cook, Secy.  
Pres. & Tre. N. C. North, Supl.  
MANUFACTURERS OF PATENT CORRUGA-  
TED FIRE-PROOF SHUTTERS, ROOFING, SIDING,  
LATH, CHILLING, FLOORING, SHINGLES, &c.  
Work in our line put up in all parts of the country,  
and guaranteed satisfaction.

**Iron.**  
NEW YORK.  
**HARRISON & GILLOON**  
**IRON AND METAL DEALERS,**  
558, 560, 562 WATER ST., and 302, 304, 306 CHERRY ST.,  
NEW YORK.  
Have on hand, and offer for sale, the following:  
Scotch and American Pig Iron, Wrought, Cast and  
Machinery Scrap Iron, Car-Wheels, Axles and Heavy  
Wrought Iron; also old Copper, Composition, Brass,  
Lead, Pewter, Zinc, &c.

**PETTEE & MANN,**  
Dealers in  
Ulster, English Refined & Common  
**BAR IRON,**  
Scotch and American Pig Iron, Wrought &  
Cast Scrap Iron, &c., &c.,  
228 & 229 South and 449 & 451 Water Sts., N. Y.  
The highest price paid for Wrought and Cast Scrap  
Iron. Storage for Pig, Bar and Railroad Iron taken at  
the lowest rates.  
D. L. PETTEE. G. A. MANN.

**OXFORD IRON CO.,**  
**Cut Nails and Spikes,**  
R. R. Spikes, Splice Bars and  
Nuts and Bolts,  
61, 63 & 65 Washington, near Rector St., N. Y.  
COLLIER & SCRANTON, Agents.

**DAVID CARPENTER,**  
Manufacturer of  
**HOT PRESSED NUTS,**  
And Dealer in  
All kinds of Refined Bar & Horse Shoe Iron,  
402 Water Street, New York.

**THE SPRINGFIELD IRON COMPY,**  
SPRINGFIELD, ILLINOIS,  
Is now ready to receive orders for the manufacture of  
**IRON RAILS,**  
Of a quality second to none.  
Capacity of Works, 25,000 tons per annum.  
Chas. Ridgely, Pres. J. W. Bunn, Vice Pres.  
George M. Brinkerhoff, Secy.  
E. A. Richardson, Supt.  
Agent in New York,  
GEORGE T. M. DAVIS, 47 Exchange Place.

**BURDEN'S**  
**HORSE SHOES.**  
"Burden Best"  
Iron.  
**Boiler Rivets.**

Burden Iron Works, H. Burden & Sons,  
Troy, N. Y.

Established in 1849.  
**THE**  
**Jackson & Woodin Mfg. Co.**  
Successors to JACKSON & WOODIN,  
Manufacturers of  
**Car Wheels and Cars,**  
**BERWICK,**  
COLUMBIA, CO., PA.

**Chain.**  
**CAIN, GORDON & CO.,**  
**Union Chain & Anchor Works,**  
1845 Richmond Street.  
Office S.W. cor. Queen & Swanson Sts.  
PHILADELPHIA.

**American Chain Cable Works,**  
38 Years' Experience in the Business.  
**KENDRICK & RUNKLE,** Trenton, N. J.  
Manufacturers of Cable, Crane, Coal Mine  
Slope, Car Brake Chains, Traces, Breast,  
Binding, Cow and Log Chains of all kinds.  
N. B.—The highest grades of Crane Chains a spe-  
cialty.

**New England Chain Works**  
771 Eddy Street, Providence, R. I.  
Manufacture Iron Chain of every description.  
**Mowing Machine, Crane, Break,**  
**Draft Chains, &c., &c.**  
Also, Latest Improved Cotton Can Rings.  
THOS. WYATT, Proprietor.

**Iron.**  
PITTSBURGH.  
**Pittsburgh Foundry.**  
**A. GARRISON & CO.,**  
Manufacturers of  
**CHILLED AND SAND**  
**ROLLS,**  
Of acknowledged superior quality, at the lowest cur-  
rent prices.  
Ore and Clay Crushers, and Roll-  
ing Mill Castings,  
of every description.  
Office and Warehouse, 209 Liberty Street.  
PITTSBURGH, PA.

**PENNSYLVANIA IRON WORKS.**  
**EVERSON, GRAFF & MACRUM.**  
Pittsburgh, Pa.  
Manufacturers of every description of  
Bar, Sheet and Small Iron,  
Make a specialty in  
Fine and Common Sheet Iron.

**AMERICAN IRON WORKS.**  
**Jones & Laughlins,**  
Manufacturers of  
**Bar Plate and Sheet Iron,**  
Nails, Ship and Railroad Spikes, R.R. Splice Bars and Bolts,  
Celebrated Cold-Rolled Shafting, Piston Rods, &c.  
PITTSBURGH, PA.  
40 42 and 44 River Street CHICAGO.  
Stocks of Cold-Rolled Shafting in store and for sale by  
Messrs. FULLER, DANA & FITZ, Boston, Mass.  
Messrs. GEORGE PLACK & CO., New York. Messrs.  
PEIRCE & WHALING, Milwaukee, Wis.

**SOLAR**  
**IRON WORKS.**  
**Wm. Clark & Co.**  
MANUFACTURERS OF  
**HOOP, BAND**  
AND  
**SCROLL IRON,**  
Railroad St., above 33d,  
PITTSBURGH PA.

**W. P. TOWNSEND & CO.,**  
Manufacturers of  
**WIRE and**  
**Black and Tinned Rivets**  
OF CHOICEST CHARCOAL IRON.  
Rivets any diameter up to 7-16 inch and ANY LENGTH  
required.  
19 & 21 Market St., PITTSBURGH PA.

**Boston Rolling Mill**  
Manufacture extra quality small Rods, from best se-  
lected Scrap Iron.  
Swedish and Norway Shapes,  
**NAIL and WIRE RODS.**  
Also **HORSE SHOE IRON.**  
W. B. ELLIS & CO., Proprietors.  
Office, 17 Batterymarch St., Boston  
**"PEMBROKE"**  
Round, Square & Flat Iron.  
**"FRANCONIA" Shafting & Bar Iron.**  
Extra quality when great strain or superior finish  
is required. Also, Irons for ordinary work, like the  
**"ENGLISH REFINED."**  
**WM. E. COFFIN & CO.,**  
No. 8 Oliver Street, Boston.

**LYNCHBURG IRON WORKS,**  
F. B. DEANE, Jr., & SON, Proprietors,  
LYNCHBURG, VA.,  
MANUFACTURE  
**RAILROAD, BOAT & COUNTERSUNK HEAD**  
**SPIKES, FISH PLATES & BOLTS,**  
Bridge Rods, Hexagon, Square, T and But-  
ton Head Bolts, Bolt Ends, Rivets, Car  
Wheels from best Cold Blast Charcoal Iron,  
Locomotive, Car, Engine and Bridge Cast-  
ings, Chilled Rolls, Rolling Mill and Blast  
Furnace Castings.

**Bonnell, Botsford & Co.,**  
**Iron, Nails & Spikes,**  
YOUNGSTOWN, OHIO.

**J. W. Patten & Co.,**  
Dealers in  
**Engineers' and Miners' Supplies,**  
**MACHINERY, STEAM PUMPS, &c.**  
No. 109 Market Street,  
WILKES-BARRE, PA.



# W. & B. DOUGLAS,

MIDDLETOWN, CONN.

The Oldest and Most Extensive Manufacturers of

## PUMPS, HYDRAULIC RAMS, GARDEN ENGINES

AND OTHER

## Hydraulic Machines

IN THE

UNITED STATES.

Several Hundred Kinds, Styles and Varieties of these Articles in Large Stock, constantly on hand.

Highest Medal awarded them by the Universal Exposition, at Paris, France, in 1867.

Descriptive Catalogues and Price Lists sent when requested.

BRANCH WAREHOUSES,

85 & 87 John Street, NEW YORK.

AND

197 Lake St., CHICAGO, ILL.



# UNION MANUFACTURING COMPANY,

Manufacturers of all styles

PLAIN AND ORNAMENTAL

## Cast, Fast & Loose Butts,

Drilled and Wire Jointed.

Japanned, Figured Enamelled, Nickel Plated, with and without Cap, and Real Bronze Butts.

Also, a full line of

IRON AND BRASS PUMPS,

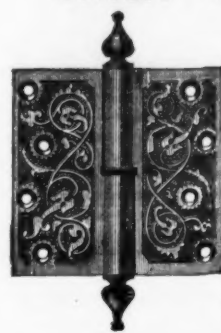
Cistern, Well, and Force Pumps, Yard, Drive Well, Garden Engine and Steam Boiler Pumps, Hydraulic Rams, etc., and all with the most modern improvements.

For Fine Castings a Specialty.

NEW BRITAIN, CONN.

Warehouse, 55 Chambers Street, NEW YORK

Send for New, Illustrated Catalogue and Price List.



## THE LARGEST PUMP WORKS, IN THE WORLD.

Over 800 different styles

Pumps, Steam Pumps, Rotary Pumps, Centrifugal Pumps, Piston Pumps,

for Tanners, Paper Mills, Fire Purposes, suitable for all situations imaginable. Send for Catalogue. Address

## RUMSEY & CO.,

SENECA FALLS, N. Y.

ALSO, FOR

## Hand Fire Engines,

Address RUMSEY & CO., Seneca Falls, N. Y., U. S. A.



## E. M. CHAPIN,

MANUFACTURER OF

RULES, PLANES, GAUGES,  
Levels, Hand and Bench Screws, etc., etc.

Established in 1826 by H. Chapin.

Manufacturing Address,

H. CHAPIN'S SON,

PINE MEADOW, CONN.

## All Iron Wheel Barrows

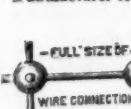


We are now making over 30 different sizes and patterns of these Barrows, adapted to coal, foundry and railroad use, brick makers, and others. Also Coke Cars, Coal Tubs, Dock Blocks & Ash Buckets for Steamers. Send for Price List.

JAMES E. HALSEY, Mfrs.' Agent,  
76 READE STREET, N. Y.

## JOHN MAXHEIMER

Manufacturer of



JAPANNED and PATENT EUREKA Bright Metal

## BIRD CAGES,

Nos. 247 & 249 Pearl Street,  
NEW YORK.



## WRIGHT'S

Double Acting,  
BUCKET - PLUNGER  
STEAM PUMPS.

ALWAYS RELIABLE

VALLEY MACHINE CO., Easthampton, Mass.

WOODWARD STEAM PUMP MFG. CO.

Steam Pump and Fire Engine,

AND

Steam, Water and Gas Fitting of all kinds.

Also, Wholesale and Retail Dealers in WROUGHT IRON PIPE, BOILER TUBES, etc.

Woodward Building, Nos. 76 & 78 Centre Street, Cor. Worth Street, NEW YORK.

GEO. M. WOODWARD, Pres't.

## JAMES T. MAGUIRE,

MANUFACTURER

Builders' Wrought Iron Goods,

HOOKS HASPS AND STAPLES,

Awning Hooks, Corner Irons, Rings, Meat Hooks, Horse S. Placers, Tongs, &c.

See Price List.

Messrs. WM. F. SHATTUCK & CO., 115

Chambers Street, Agents, &c.

Manufactory, 606 E. 11th St., New York.

## Old Errors and New Truths Pertaining to the Crank Engine.

BY H. BOYNTON, M. E.

(Concluded.)

TANGENTIAL VALUE ILLUSTRATED BY GRAVITATION.

The considerations thus far given might be deemed complete and abundant, but practical engineers resort to illustrations by the force of gravitation, representing the average crank obliquities by the inclined plane, when by an indiscriminate or improper use of the conditions pertaining to it, they claim that the lesser resultant equals the greater primary.

We, therefore, define and illustrate the correct relation of values by gravitation, and shall show that gravitation, by the same mass over the pulley, can raise 42 3/4 lbs. 16 feet high in 1.57 seconds, whilst by the plane no weight can by any possibility be raised.

Also, shall show the mechanical value by the inclined curve, and that gravitation, by the same mass over the pulley, can raise 33 1/2 lbs. 16 feet high in 1.41 seconds, whilst by the curve or crank arc no weight can by any possibility be raised.

And these practical truths establish the loss of power under the well known laws of gravitation, unequivocally.

In Fig. 4 we have by the pulley a simple standard of gravitation, and in Fig. 5 the average obliquities of the crank, shown by the inclined plane.

To pulley A we have mass *m* (of 100 lbs.) at

Fig. 4.

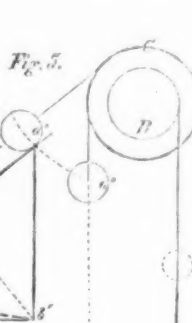


Fig. 5.



*a*, which will fall to *b* or 16.083 feet, equal to space *s*, in one second, equal to time *t*. And  $g = m s t$ , or *m*.

To the plane *a' d*, we have mass *m* at *a'*, which will fall to *d* or 25.2632 feet, equal to space *s'* in 1.5708 seconds, equal to time *t*, and  $m s' t'$  equal *v*.

In *a b*, *m* moves at velocity *v*, or 16.083 feet per second, but in *a' d*, *m* is intercepted by the plane and cannot move at velocity *v*. If we construct the perpendicular *b' d'* to the plane *a' d*, then *a' d'* measures the velocity tangentially to the plane (as *a i* does in Fig. 1), and equals 10.2384 feet per second, or 4366 *v*, which equals *v*.

And *g* equals *m s' t'*, or *m v* plus *p' v*, in which *p'* equals the pressure on the plane. As *m v* equals *m* × 4366 *v*, equivalent to 4366 *m v*, we have *m v* = 4366 *m v* = 3634 *m v* = *p' v*.

Hence, by the pulley, we have *m v* = *g*. By the plane, 4366 *m v* = 3634 *m v* = *g*. But 3634 *m v* is lost.

This is an absolute loss of so much of the power of gravitation, because *m v*, by the pulley, is the resultant work and equivalent of *g*, and 4366 *m v* by the plane, is the resultant work of *g*, whilst *p' v* is the development of so much of *m v* as renders the tangential development possible. And 4366 *m v* + *p' v* is the equivalent of *g*.

In these relations, *s* by the pulley equals the piston, and *s'* by the plane the crank-pin travel. These values given are the dynamic resultants of gravitation.

We now attach the cord to *m* at *a'* from pulley C, which is to pulley B as *s'* is to *s*, and with the weight *w* of 100 lbs. at *g*, we have their anti-mechanical or static equilibrium.

It is anti-mechanical, because *m* requires 1.5708 feet radii of pulley to sustain *w* with 1 foot radii, as neither can impart motion.

Hence, the difference of radii measures the mechanical loss.

Again: We may now remove the plane and let *m* change from *a'* to *a*, by which it will assume its mechanical relation to *w*, and the value of *g* in *m* is now to that by the plane as C is to B, *w* being the equivalent of *m* by the plane.

If *m* falls freely, it will now pass *s'*, or 25.2632 feet, in 1.253 seconds, but *w* over B intercepts 4366 of *g* in *m*, as B equals 4366 C, so that we have *m + w* to be moved by 3634 of *g* in *m*. As *w* over B is equivalent to 4366 *w* over C, we have *m + w* equivalent to 1.6366 *m*.

And as 3634 *g* in *m* will move *m* at 3634 *v*, it will move 1.6366 *m* at 222 *v*, or at 3.5704 feet per second, and *w* over B at 4366 × 222 *v*, or at 1413 *v*, which is 2.273 feet per second.

Hence, *m* at *a'* will raise 100 lbs. in *w* at 1413 *v*, or 2.273 feet per second, which is 16.083 feet in 2.66 seconds, as it is by a constantly accelerated velocity.

Consequently, we see that the tangential duty of *g* by the plane only equals 63.66 per cent. of that in mechanical action, for the following reasons:

1st. Statically: Because *m* by the plane requires the pulley C to be 1 foot diameter to sustain *w* in static equilibrium over B with 4366 feet diameter.

This greater diameter of C is a mechanical loss, due to the anti-mechanical developments of *g* upon the obliquities of the plane, for *g* over C ought to sustain 1.5708 *w* over B in static or

mechanical equilibrium. The anti-mechanical difference, or loss, equals 36.34 per cent. of C.

2d. Dynamically: Because intercepts only 63.66 per cent. of *g* over C. Hence, *g* should raise *w* freely by the plane.

3d. Because *g* in *m* at *a'* cannot impart motion to *w*, but at *a* it imparts 222 *v* to *w* and 1413 *v* to *w*.

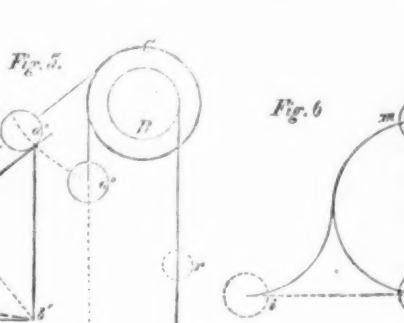
4th. Because *m* × 222 *v* = 222 *m v*, and *w* × 1413 *v* = 1413 *m v*, and 222 *m v* + 1413 *m v* = 3634 *m v*, and equals 36.34 per cent. of *g*.

Hence, the velocity imparted at *a'* over that at *a* equals 36.34 per cent. of *g*, and equals the loss by the obliquities at *a*.

Notwithstanding this loss of 36.34 per cent. of the force of gravitation, whether statically or dynamically considered, this combination of pulleys and plane is resorted to by practical engineers to cover up the loss we have shown, hence they have used the anti-mechanical conditions of the obliquities without proper discrimination, and have derived false and deceptive conclusions where they ought to have proven the loss beyond controversy.

Therefore, we define and illustrate more fully the developments of equal masses through equal heights in equal times, by the plane and by the pulley, and so clearly and practically that the prevailing errors may be forever silenced, and the truths of science practically and duly accredited.

Gravitation is measured statically, by the weight of mass (or tendency to motion) and dynamically by the velocity it can impart when moving freely in space, and these values are mechanically interchangeable. Hence, we re-



duce the velocity in *a b* by connecting *m* by cord *a w* to *w*, with which we must make a two-fold reduction, and, first, of 36.34 per cent. to equal the tangential velocity along the plane, and, secondly, to correspond to the space *a b* as less than *a' d*, which reductions are to 6.5178 feet per second, or to 4053 *v*, when *m* will move to *b* in 1.5708 seconds.

In order to reduce the velocity of *m* from *v* to 4053 *v*, we must intercept gravitation in the same ratio of the reduction, and as we have reduced it 5947 *v*, we add to cord *a w* weight *w* of 5947 lbs., which constitutes a static equivalent or mechanical balance to 5947 *g*, when the remainder of *m*, or 4053 *m*, is the equivalent of  $m \times 4053 \text{ } v$ , or equals 4053 *m v*.

But the 5947 lbs. at *w* produces a static interception, and will reduce the velocity of *m + w* below 4053 *v*, we must therefore reduce the weight in *w* to its dynamic equivalent, and as 4053 *m* : *m* :: 17.15 lbs. : 42.33 lbs., if we make *w* equal 42.33 lbs., we establish the velocity of 4053 *v* to *m + w*.

We now have *m* moved 16.083 feet plus *w* raised against gravitation, 16.083 feet in time *t*. The force of gravitation in *w* equals *v*, or 39.688 feet in time *t* or *w v*, and to raise it through 16.083 feet in same time *t* requires  $v + 4053 \text{ } v$ , hence it is equivalent to 4233  $m \times 1.4053 \text{ } v = 5947 \text{ } m v$ .

We have therefore  $m \times 4053 \text{ } v + w \times 1.4053 \text{ } v$ , and their sum equals 4053  $m v + 5947 \text{ } m v$ , or *m v*.

By the plane we have 4366  $m v + p' v$  (or 3634 *m v*), and their sum equals *m v*.

But *p' v* by the plane is lost and equals 3634 *g*.

We therefore show the loss of this quantity of gravitation:

1st. By the fact that it is impossible to raise any weight by the gravitation in *m* along the plane, whilst by the mechanical transmissions of the pulley it raises 42.33 lbs. at the accelerated velocity of 4053 *v*, or 6.5184 feet per second, which equals 16.083 feet in 1.5708 seconds.

2d. By taking the masses moved into their spaces, their times being equal.

By the plane we have *m*, or 100 lbs., moved 25.2632 feet, which equals 2526.32 lbs. moved 1 foot in 1.5708 seconds.

By the pulley we have *m*, or 100 lbs., moved 16.083 feet, which equals 1608.3 lbs. 1 foot in 1.5708 seconds, or *t*.

Also, *w*, or 42.33 lbs. raised against gravitation, which is equivalent to  $w \times v$  : 4053 *v*, or  $w \times 1.4053 \text{ } v$ . And *v* equals 39.688 feet in time *t*, and 4053 *v* equals 1608.3 feet, and their sum equals 55.766 feet in time *t*, and  $w \times 1.4053 \text{ } v = 42.33 \text{ } v$ , 55.766 feet, or the equivalent of 2360.58 lbs. 1 foot in *t*.

Their sum equals 1608.3 lbs. + 2360.58 lbs., or 3968.88 lbs. 1 foot.

Hence, by the pulley, *g* in *m* equals 3968.88 lbs. moved 1 foot in 1.5708 seconds.

By the plane, we have *g* in *m* as only equal to 2526.32 lbs. moved 1 foot in same time.

The difference of 1442.56 lbs. moved 1 foot by the pulley in excess of that by the plane, equals the loss of power by the plane, and equals 36.34 per cent. of gravitation.

3d. Because the power due to gravitation in *m*, if falling freely through time *t*, equals 100 lbs. × 39.683 feet, or the equivalent of 3968.3 lbs. 1 foot.

By the plane it only equals 2526.3 lbs., and the difference is 1442 lbs. 1 foot in 1.5708 seconds, lost, which is the same as shown by the pulley.

4th. Because *p' v*, or the 1442 lbs. lost in time *t*, cannot have any apparent duty in *m*, since it is developed to produce tangential resultants from the obliquities of application to the plane.

5th. Because the plane correctly represents the average obliquities by the crank, these considerations demonstrate the impossibility of transmitting the full power applied to the crank-pin. Also, that the average tangential loss equals 36.34 per cent. of the applied power.

MECHANICAL VALUE ILLUSTRATED BY GRAVITATION.

Now illustrate the mechanical value of gravitation by the crank-pin arc, or inclined curve.

In Fig. 6 we have the same force *g*, mass *m*, spaces *s*, and a total time of 1.4142 seconds equal *T*, and we have before shown the mechanical value of steam by the crank as 78.54 per cent. of the primary. Hence, where *m* is constant, its velocity in the arc *g h*, or curve *g i*, will equal 7854 *v*, or 12.6315 feet per second. The time equals the 25.2632 feet, or 1.4142 seconds, or *T*.

We now show the value of *g* by the crank arc with that by the pulley in time *T*. And *m* falling freely by the crank-pin arc, or inclined curve, will pass *s*, or 25.2632 feet in *T*, and will develop *m s T*, or velocity *V*. And *m V* equals the apparent duty. But *g* has developed a pressure *P* on the arc, or curve, from which to derive change of direction to the tangents of the arc, and as *m V* equals 7854 *g*, we have  $g = m V = 2146 \text{ } v$ . And as *v* equals  $m \times 7854 \text{ } v$ , it equals 7854 *m v*, and as *P v* equals 2146 *m v*, their sum equals *m v*. Of which *P v* is lost.

And *m V* equals 100 lbs. moved 25.2632 feet, or 2526.32 lbs. 1 foot in 1.4142 seconds. But *g* in *m*, if falling freely, equals  $m \times 32.16 \text{ } v$ , or 3216 lbs. 1 foot in 1.4142 seconds. Therefore, their difference, or *P v*, which is lost, is equivalent to 690.3 lbs. 1 foot in 1.4142 seconds. Equals 21.46 per cent. of *g*.

By the pulley, *m*, if falling freely, would pass 32.166 feet in time *T*, but it is necessary to reduce this velocity one-half, or to 16.083 feet in time *T*, when at 8.0415 feet per second, we have  $T \times 8.0415 \text{ } v$  equals 16.083 feet.

Therefore, we must reduce the free velocity of *m*, because that due to the curved incline or crank-pin arc only equals 7854 *v*, and because the space *a b* only equals 4366 of curve *g i*, or arc *g h*.

And to reduce the velocity in *a b* one-half, we add to the cord *a w* in same ratio of the reduction of velocity, or 50 lbs., which constitutes a static equivalent to one-half of *g*, when only 5 *m* remains effective, but this cannot move *m + w* at 5 *v*, yet can move *m* at 5 *v*. And as 5 *m* : *m* :: 16.67 lbs. : 33.33 lbs., if we make *w* equal 33.33 lbs., the remainder, or 16.67 lbs., becomes effective in *m*, and will move *w* at 5 *v*, when we have *m + w* or 1.3333 *m* moved at 5 *v*.

We now have *m* moved 16.083 feet, plus *w* raised against gravitation, 16.083 feet in time *T*. To raise *w* against gravitation at 5 *v* equals  $w \times v + 5 \text{ } v$ , or 333.3  $m \times 1.5 \text{ } v$ , and their product is 5 *m v*. And 1.5  $v = 32.166 \text{ } v$ , or 3216.6 lbs. 1 foot in 1.4142 seconds, and 100 lbs. 16.083 × 33.33 lbs. = 48.249 feet = 3216.6 lbs. 1 foot in 1.4142 seconds.

If, instead of the weight *w* raised against gravitation, we take a mass to which gravity is intercepted, or mechanically balanced, so that only the inertia of the mass is to be overcome, then as 5 *m* : *m* :: 2 *m*, we would have *m* + the additional *m* = 300 lbs., to which *m* will give 5 *v*, making 200 lbs. 16.083 feet, or 3216.6 lbs. 1 foot in 1.4142 seconds, same as by pulley.

By the crank-pin curve or arc we have 2526.32 lbs. 1 foot in 1.4142 seconds. Their difference, or 690.3 lbs., is lost.

This difference or mechanical loss equals 21.46 per cent. of pulley duty or of gravitation in *m*. The absolute loss of this force of gravitation by the curved incline or crank-pin arc is therefore shown:

1st. Because no weight can be raised by the crank in time *T*.

2d. Because the total developments of gravitation in *m*, if falling freely, equal those by the pulley and equal 3216.6 lbs. 1 foot in 1.4142 seconds.

</



## Iron.

## CLEVELAND.

**Cleveland Rolling Mill Company,**  
MANUFACTURERS OF  
**BESSEMER STEEL RAILS,**  
Steel Plates and Forgings, Railroad Iron, Merchant  
Bar, Beams, Girders, Splices, Bolts, Spikes, &c., &c.  
Rt. 1, Nos. 99 & 101 Water St., CLEVELAND, O.  
J. H. STONE, Pres. H. CHISHOLM, V. P. & Gen. Supt.  
E. S. PAGE, Sec'y.

**Cleveland, Brown & Co.**  
REPORTERS, MANUFACTURERS AND DEALERS IN

**IRON AND STEEL,**  
HORSE SHOES, HORSE NAILS,  
NORWAY NAIL RODS,  
NAILS, SPIKES,  
"Standard Taper" Axles & Swedes Iron,  
WINDOW GLASS,  
Wrought Iron Pipe and Boiler Tubes  
Chains, Rivets, Nuts, Washers, and Heavy  
Hardware Generally.  
25, 27, 29 & 31 Merwin Street,  
CLEVELAND, OHIO.

**Niles Iron Co.,**

Manufacturers of

**Bar & Sheet Iron,**

NILES, OHIO.

L. G. ANDREWS, President.  
L. E. COCHRAN, Sec'y. & Treas.  
S. E. BROWN, Gen'l Supt.

## OLD DOMINION

Iron and Nail Works Company,  
RICHMOND, VA.,

R. E. BLANKENSHIP, Commercial Agent,  
Manufacture  
**NAILS AND BAR IRON,**  
Bands, Scrolls, Horse Shoe Bars, Nut and  
Rivet Iron, Spike Rods, Shunting, Bridge  
Bolts, Ovals, Half Ovals, Half Rounds, &c.

HALL, KIMBARK & CO.,

**IRON,**

STEEL, NAILS, HEAVY HARDWARE.  
89, 92 & 94 Michigan Ave., Chicago.

## Coal.

L. S. BOYER & CO.,

Wholesale dealers in  
Anthracite & Bituminous Coal & Coke.  
Selling Agents for  
GEORGE'S CREEK CUMBERLAND COAL,  
Mined by the Hampshire & Baltimore Coal Co.  
OFFICES: 70 Broadway, N. Y.  
56 Exchange Place, Baltimore.  
220 Walnut St., Philadelphia.

B. W. PERSONS,

Broker and Dealer in

Anthracite and Bituminous Coals,  
SCOTCH & AMERICAN PIG IRON,  
No. 39 Weybosset Street, Providence, R. I.  
A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

**A. PARDEE & CO.,**

303 Walnut St.,

PHILADELPHIA.

MINERS AND SHIPPERS OF

**Lehigh Coals.**

The following superior and well-known Lehigh Coals  
are mined by ourselves, and firms connected with us  
via.

A. Pardee & Co. { HAZLETON,  
CRANBERRY,  
SUGAR LOAF

G. B. Markle & Co. { JEDDO,  
HIGHLAND.

Pardee, Bro. & Co. LATTIMER.

OFFICES:

WM. LILLY Mauch Chunk, Pa.  
WM. MERSHON, Agent, 111 Broadway N.Y.  
WM. H. DAVIS, Agent, Easton Pa.

## Leather Belting.

**Alexander Brothers,**  
Manufacturers of OAK TANNED

**Leather Belting**  
412 North 3d, Philadelphia, Pa.

WM. H. STOYLE.

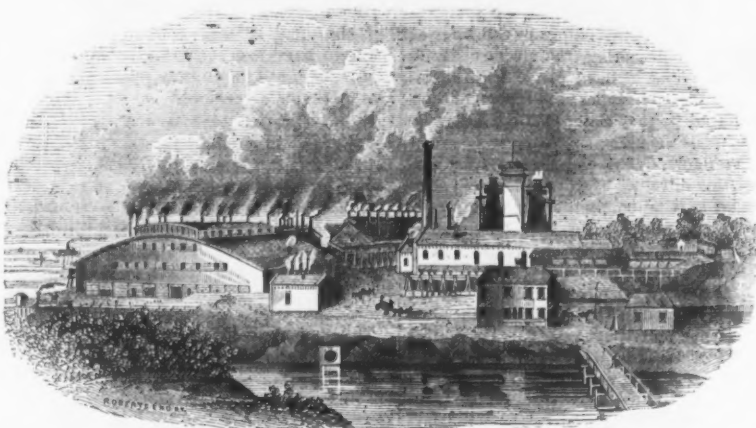
MANUFACTURER OF

**Machine Cut Belt Lacing,**  
No. 403 Library Street,

## Iron.

## MILWAUKEE IRON CO.,

MANUFACTURERS OF



## RAILROAD IRON

of Unsurpassed Excellence.

Capacity of Works, 45,000 Tons of Rails per Annum.

E. B. WARD, Pres. ALEX. MITCHELL, Treas. J. J. HAGERMAN, Sec'y. & Agent.

MILWAUKEE, WIS.

## Evansville Rolling Mill Co.,

MANUFACTURE

## RAILROAD IRON ONLY.

Capacity - - - 24,000 tons per Annum.

Evansville, Ind.

W. F. NISBET, Treas.

WILLARD CARPENTER, Pres.

J. McDONUGH, Secretary.

## T. ELLIS &amp; BRO.,

Iron Founders and Machinists,

2303 Coral Street, (19th Ward,) PHILADELPHIA.

IRON CASTINGS of every description made to order at shortest notice.

**IMPROVED VERTICAL STEAM ENGINE,**  
Shaftings, Pulleys, Hangers and Machinery in General.

Cast Iron Steam Heating Pipe (faced and drilled) on hand and for sale.

PATTERN MAKING IN ALL ITS BRANCHES.

**George Buchanan.**

(Established 1853.)

Exporter of

## OLD RAILS

IRON AND STEEL RAILS, PIG IRON,  
Machinery of every description.  
19 BIRCHIN LANE, LONDON, ENGLAND.  
Bankers—Messrs. Barclay, Bevan, Tritton,  
Twells & Co., 14 Lombard Street, London.

Artistic & Enduring

## MONUMENTS,

IN GRANITE AND BRONZE.

Designs remitted by Mail.

National Fine Art Foundry

218 East 25th Street, New York.

James S. Patterson,

**Designer & Engraver  
on Wood,**

21 Spruce Street, NEW YORK.

L. Worthington, President. Wm. H. Sayre, Secretary.

Arthur G. Moore, Supt.

**The Cincinnati Railway Iron Works,**  
OFFICE,

No. 493 East Front St., Cincinnati, O.

MANUFACTURE

**RAILWAY IRON,  
SOLID I BEAMS,**

Channel Plate, T, Angle and Heavy Iron gen-  
erally for Bridges and fire-proof Buildings.

Address  
ARTHUR G. MOORE, Superintendent.

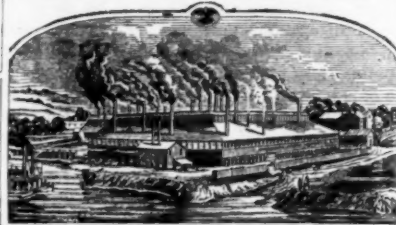
BIRMINGHAM, ENGLAND

**SAMUEL A. GODDARD & CO.,**

Commission Merchants and General Agents

execute orders for British manufactures on the lowest  
terms, and collect and forward goods for a very mod-  
erate payment. Agents for the sale of North Staf-  
fordshire Iron of a standard quality.

## AGENCY SHEET IRON MILLS.



W. D. Wood & Co.'s and other reliable brands at  
the lowest market rates.

SIDNEY SHEPARD & CO., Buffalo, N. Y.

## DUMPING TRUCK

FOR  
Bar Iron, Lumber, &c.

**Abeel's Dumping Truck,**

Patented July 22, 1873.

A simple attachment to an Iron or Lumber Truck,  
which permits the load to be deposited at any de-  
sired spot in a few seconds.

It is Cheap and Strong, and may be applied to  
trucks now in use or to new ones.

City, County and State rights for sale. For further  
information, address

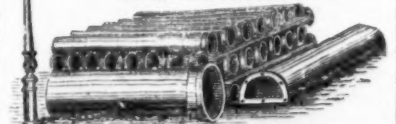
J. AUSTIN & CO.,

168 Fulton St., N. Y.

R. D. WOOD & CO.,

PHILADELPHIA,

Manufacturers of  
Cast Iron Water and Gas Pipe,  
Lamp Posts, Retorts, &c.



Also, Race & Mathews' Patent Hydrant. This Hy-  
drant is perfectly anti-freezing, is the most ornamental  
and the cheapest made.

R. PAINE, Selling Agent,  
Office, 113 Broadway, N. Y.

## Iron.

## CAST IRON FLANGE PIPES

Of any length or diameter, for Steam Engines, Exhaust Steam, Fire Purposes, Refineries,  
both Faced and Drilled and Plain. Also,

**GAS and WATER PIPES**

Of all sizes, with necessary connections for  
same. LAMP POSTS, FIRE HYDRANTS,  
VALVES, &c.

R. A. BRICK & CO., Mfrs., 112 Leonard St., N. Y.

## METALS.

THOMAS J. POPE & BRO.,

292 Pearl Street, NEW YORK,

PIG IRON—Scotch and American,

Ingot Copper, Spelter, Nickel,

AND METALS GENERALLY.

OLD RAILS, SCRAP IRON, &c

Consignments Solicited on fair Advances.

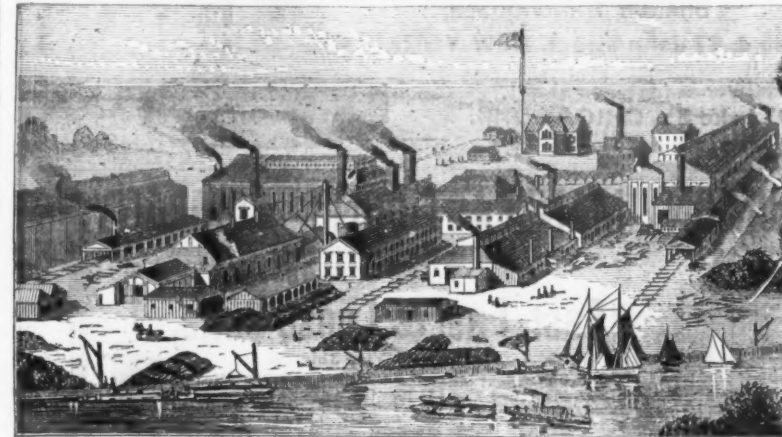
JESSE W. STARR.

BENJ. A. STARR.

BENJ. F. ARCHER.

## CAMDEN IRON WORKS

(Established 1824), CAMDEN, N. J.



**JESSE W. STARR & SONS,**

Engineers, Contractors and Manufacturers of Gas Apparatus.

And all the

Buildings, Tanks, Holders, &c., required for the Manufacture, Purification, and Storage  
of Gas, and Street Mains Requisite for its Distribution.

Plans, Drawings, and Specifications promptly furnished.

## IRON FOUNDERS.

CAST IRON STREET MAINS, for Water and Gas, from One and a Half Inches to

FORTY-EIGHT Inches in Diameter.

Stop Valves (all sizes), FIRE HYDRANTS, HEATING PIPES, BRANCHES, BENDS, TEES  
CASTINGS of any form or size required.

PHILADELPHIA OFFICE. - - 403 WALNUT STREET.

## JOLIET IRON &amp; STEEL CO..

Joliet, Ills.,

MANUFACTURERS OF

**PIG METAL, RAILROAD IRON,  
And Bessemer Steel Rails.**

Office, 94 Washington Street, CHICAGO.

A. B. MEEKER, President.

J. H. WRENN, Sec'y and Treas.

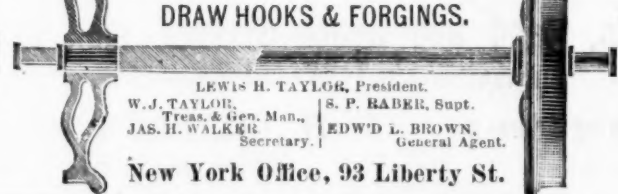
## TAYLOR IRON WORKS,

HIGH BRIDGE, N. J.,

On the line of the Central Railroad of New Jersey.

**CAR WHEELS, CAR AXLES,**

**DRAW HOOKS & FORGINGS.**



LEWIS H. TAYLOR, President.

W. J. TAYLOR,

Treas. & Gen. Mgr.

JAS. H. WALKER,

Secretary.

S. P. RABER, Supt.

EDWD L. BROWN,

General Agent.

New York Office, 93 Liberty St.

## ATKINS BROTHERS,

PROPRIETORS OF THE

**Pottsville Rolling Mills & Pioneer Furnaces**  
POTTSVILLE, PENNSYLVANIA.

Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their  
Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to  
produce

## RAILROAD IRON

Of uniform quality, unsurpassed for strength and wear, and of any required length.

Address the Proprietors Pottsville, Pa.

**The Britannia Ironworks Company, Limited,**  
Middlesbro' England,

MANUFACTURERS OF

**ALL DESCRIPTIONS OF IRON RAILS**

Surplus Stocks of Various Sections always on hand.

London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.

Weekly Output, One Thousand Tons.

**NEW HAVEN  
Rolling Mill Comp'y**

Manufacturers of Merchant, Horse Shoe, and extra  
quality Iron. Guaranteed to stand specified tests.  
Special orders taken for common Iron.

New Haven, CONN.

**Geo. A. Boynton**  
BROKER IN IRON  
70 WALL ST. N.Y.



**Iron.**

PHILADELPHIA.

**Iron and Steel T and Street Rails**

Of Best American and English Makes.  
CHAIRS, SPIKES, FISH BARS,  
RAILROAD SUPPLIES.  
Muck Bars, OLD RAILS, Scrap,  
BLOOMS.

American and Scotch  
PIG IRON, AND METALS.  
CHAS. W. MATTHEWS,

133 Walnut St., Phila.  
[Late RALSTON & MATTHEWS, 133 Walnut St.]

**MALIN BROS.,  
IRON**

Commission Merchants,  
No. 228 Dock Street,  
3d door below Walnut, PHILADELPHIA.

**BLAKISTON & COX,  
IRON**

Commission Merchants,  
No. 333 Walnut Street,  
PHILADELPHIA.

**CAMBRIA  
IRON COMPANY,  
JOHNSTOWN, PA.**

This Company, by mining the raw materials and manufacturing the pig metal from a mixture of the most suitable ores in their own blast furnaces, situated on both sides of the Alleghany mountains, are enabled to obtain the various kinds of iron best adapted for the different parts of a rail. Doing their own machine work and repairs, and rolling the rail way bars with the latest improved machinery they produce

**RAILS**

of an unsurpassed excellence of quality at the lowest market rates. The long experience of the present managers of the Company, and the enviable reputation they have established for "CAMBRIA RAILS," are deemed a sufficient guarantee that purchasers can at all times, depend upon receiving rails unsurpassed for strength and wear by any others of American or foreign make. Any of the usual patterns of iron rails can be supplied on short notice, and new patterns of desirable weight or design will be made to order. The Company are also preparing to manufacture Steel Rails by the Pneumatic process. Address

**CAMBRIA IRON COMPANY**  
218 S. Fourth St., PHILADELPHIA  
or at the works, JOHNSTOWN, PA.

**S. FULTON & CO.,**  
MANUFACTURERS OF  
Pig Iron and Cast Iron Gas and Water Pipes.  
ALSO HEAVY AND LIGHT CASTINGS  
OF EVERY DESCRIPTION.  
PLYMOUTH IRON WORKS, CONSHOHOCKEN, PA.  
Office, No. 419 Walnut St., Phila.  
SAMUEL FULTON. THEO. TREWENT

**W. GRAHAM HOOPES,**  
Commission Merchant  
FOR THE SALE OF  
Pig, Bloom, Plate, Bar & Railroad  
**IRON,**  
No. 419 Walnut Street, Philadelphia.

**The Phoenix Iron Co.,**  
410 Walnut St., Philadelphia.

MANUFACTURERS OF  
CURVED, STRAIGHT AND HIPPED  
Wrought Iron Roof Trusses  
BEAMS, GIRDERS, AND JOISTS,  
and all kinds of Iron Framing used in the construction  
of Iron Roof Buildings.

Deck Beams, Channel, Angle  
and T Bars  
curved to template, largely used in the construction of  
Iron Vessels.

Pat. Wrought Iron Columns, Weldless  
Eye Bars,  
for Top and Bottom Chords of Bridges.

Railroad Iron, Street Rails, Rail Joints and  
Wrought Iron Chairs.

Refined Bar, Shafing, and every variety of  
Shape Iron made to order.

Plans and Specifications furnished. Ad-  
dress  
**SAMUEL J. REEVES Vice Pres.**

**E. R. & G. A. HART,**  
Old and New Rails, Muck Bars,  
PIG AND SCRAP IRON,  
**COPPER, &c.**  
No. 208 Walnut St., Philadelphia.  
SECOND FLOOR.

**Pipe, Fittings, &c.**

**MORRIS, TASKER & CO.,**

PASCAL IRON WORKS, Philadelphia,  
TASKER IRON WORKS, New Castle, Del.,



MANUFACTURERS OF LAP-WELDED

**American Charcoal Iron Boiler Tubes.**

Wrought Iron Tubes and Fittings of every description

FOR GAS, STEAM, WATER AND OIL.

Steam and Gas Fitters' Supplies, Machinery for  
Coal Gas Works, etc., etc.

Office and Warehouse, No. 15 Gold Street, New York.  
Branch Office, 29 Pemberton Square, Boston.

**The Billings & Spencer Co.,**

MANUFACTURERS OF

The Billings Patent Solid

**SEWING MACHINE SHUTTLE.**

ALSO,

**The Barwick Pipe Wrench,**

And all Descriptions of STEEL and IRON

**DROP FORGINGS**

For Machine Handles, Lathe Wrenches, Milling Machine Cranks,  
Thumb Screws, and parts of Guns, Pistols, Sewing  
Machines and Machinery Generally.

We also manufacture, to order,

Cap, Set, Machine and Gun Screws, of Iron, Steel or Brass.

\* Price List and "Cuts" of Goods manufactured by us sent to any order on request.

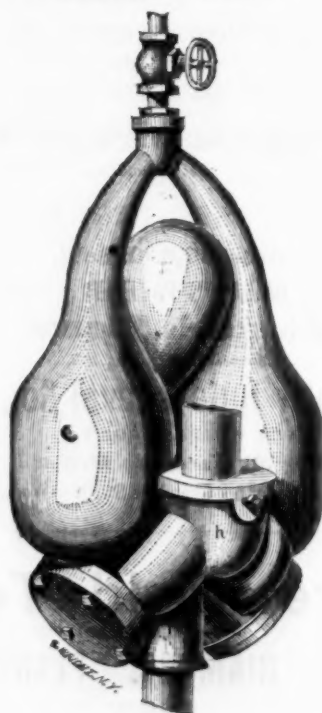
**BILLINGS & SPENCER CO.,**

Lawrence Street, Hartford, Conn.



Cor. 1st and North 3d Streets, Williamsburgh, N. Y.

**THE PULSOMETER  
OR  
MAGIC PUMP.**



The simplest, most durable and effective pump  
now in use. Adapted to all situations and performs  
all the functions of a steam pump without its con-  
sequent wear and care. No machinery about it.  
Nothing to wear out.

Will pump gritty or muddy water without wear or  
injury to its parts. It cannot get out of order.

**C. HENRY HALL & CO.,**

20 Cortlandt St., New York City.



**THE CHARLES GREGG  
MANUFACTURING CO.**

BRASS WORK of all kinds,  
FITTINGS FOR

**Steam, Gas and Water.**

PLAIN AND GALVANIZED

**WROUGHT IRON PIPE,**

Nos. 62 & 64 Gold Street,  
NEW YORK.

Business Established, 1836. Incorporated, 1872.  
Send for Price List.

**CHAS. E. LITTLE,**

59 Fulton Street, New York.

Maker and dealer in  
Coopers' and Coachmakers',  
Carpenters' and Slaters'  
and Butchers'  
Send for Catalogue.)

**Pipe, Fittings, &c.**

**McNab & Harlin Mfg. Co.,**

MANUFACTURERS OF

**BRASS COCKS**

For STEAM, WATER  
and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized  
**PLUMBERS' MATERIALS.**

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.

**PANCOAST & MAULE**  
227 Pear St.

PHILADELPHIA.

**WROUGHT IRON PIPE**

FITTINGS, BRASS & IRON VALVES & COCKS  
TOOLS & STEAM FITTERS SUPPLIES &c.

PIPE CUT & FITTED TO PLANS FOR MILLS &c.

SUCCEED MORRIS TASKER & Co. AS

**CONTRACTORS**

FOR HIGH & LOW PRESSURE STEAM HEATING  
APPARATUS FOR ALL CLASSES OF BUILDINGS.

Send for Illustrated Catalogue.

**National Tube Works Co.,**

BOSTON, MASS. and McKEESPORT, PA.;

MANUFACTURERS OF

**Best Quality Lap Welded Iron Boiler Tubes,**

**STEAM AND GAS PIPE,**

Artesian Oil and Salt Well Tubing and Casing,

With Patent Protecting Coupling;

**Mack's Patent Injector for Feeding Boilers.**

JAMES C. CONVERSE, President, McKeesport.

WM. S. EATON, Treasurer, Boston.

New York Office and Warehouse, 78 William, cor. Liberty Street.

**EATON & COLE.**

Manufacturers of

Wrought Iron Pipe  
Fittings,

BRASS

VALVES,

COCKS, TOOLS, &c.,

58 John Street, NEW YORK.

Sole Agency for the Pacific Coast for

Register's Patent Gauge Cocks,  
CONROY, O'CONNOR & CO.,  
San Francisco, Cal.

**Nelson, Finkel & Co.,**

439 East 10th St., New York,

Manufacturers of

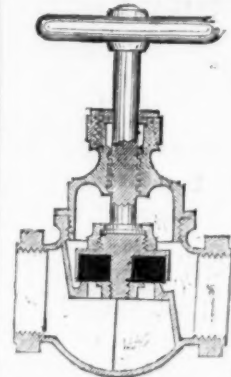
Jenkins' Patent  
Compression  
Valves

AND

Gauge Cocks

Also,

Nelson's Patent  
LUBRICATOR.



Warranted the most  
reliable and durable  
in the country.

Industrial Tube Works.

**ISAAC J. GRIFFITHS & BROS.**

Manufacturers of

Wrought Iron & Galvanized Tubes

For Gas, Steam and Water.

Brass and Iron Valves, Cocks,  
Cast and Malleable Iron Fittings.

Tubes cut and fitted to plans and specifications.

1529, 1531, 1533 & 1535 South 7th St.,  
PHILADELPHIA.

**WM. S. CARR & CO.**

Sole Manufacturers of

Carr's Patent Plumbers' Goods

Pumps, Water Closets, Fountains

Vases, &c.

OFFICE AND WAREHOUSES

106, 108 & 110 Centre Street  
Factory, Mott Haven, New York.

**CAST IRON PIPES**

FOR WATER AND GAS.

Branches Retorts, &c.

**Warren Foundry & Machine Co.,**

PHILLIPSBURG, NEW JERSEY.

**GRAFF TUBE WORKS.**

**WILLIAM GRAFF & CO.,**

Manufacturers of Plain and Galvanized

**Wrought Iron Pipe**

For

Gas, Steam, Water, Oil, &c.,

No. 140 First Ave., PITTSBURGH, PA.

Pipe of any Size, Length or Thickness furnished to  
order.

FOOTS



## THE NICHOLSON FILE.

All *Nicholson Files* are cut with the *Patent Increment Cut*, an invention owned and controlled exclusively by us, the file cut in this manner being Patented as a new article of manufacture, and differs from all other machine cut files (all of which have their teeth cut with equal spaces) by being cut with teeth slightly *expanding or increasing in size and space from the point*, thus avoiding the too great regularity of teeth common to all other machine cut files. The tendency of all cutting tools with teeth or cutters placed at regular distances from each other may be illustrated (to the machinist at least) by the fluted reamer—as it is well known that if a round reamer be made with (say 12) teeth whose spaces are equidistant, the hole reamed will *not* be round and smooth, but will approximate to a hexagon in shape. Whereas, if the same number of teeth be made of irregular distances, the hole reamed will be both round and smooth. The same is true of a file, hence the necessity of its having teeth at unequal distances, and to which we have applied the name of *Increment Cut File*, which possesses all the advantages of hand cut work, and the accuracy and uniformity of machine work. It is now upwards of seven years since this File was introduced to the public, and the demand has increased until our production is undoubtedly treble that of any File manufactory in the country.

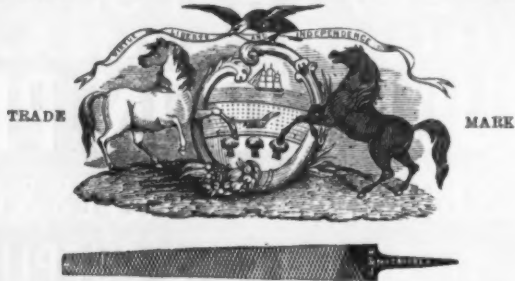
We put all files under seven inches in boxes of either one-half or one dozen each. These boxes are neatly arranged, and open on the end, on which the kind is plainly marked with printed labels, acknowledged improvements on the old methods.

The "*Increment File*" is not an experiment, but an established fact, and already has acquired a legitimate demand for upwards of 500 dozen per day. We employ no *regular Travelers*, but our goods may now be found in the hands of the principal jobbers and dealers throughout the country.

Prices and terms will be forwarded on application to

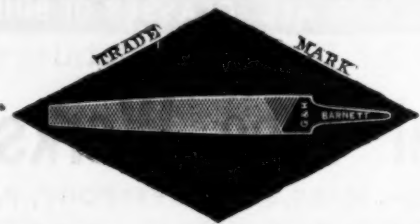
**NICHOLSON FILE COMPANY,**  
Providence, R. I.

## PENNSYLVANIA FILE WORKS.



**McCAFFREY & BROTHER,**  
Manufacturers of FIRST QUALITY FILES and RASPS ONLY,  
Nos. 1732 & 1734 North Fourth Street, Philadelphia, Pa.

## Black Diamond File Works.



**G. & H. BARNETT,** 39 41 & 43 Richmond St. Phila.

1816. 1844. 1850. 1868.  
H. F. F. H. F. F. & SON. P. A. F. P. A. F. & CO

**PETER A. FRASSE & CO.,**  
95 Fulton Street, New York,  
IMPORTERS OF

**Stubs' Steel Wire, Files and Tools,**  
**Grobet Swiss Files,**

Extra Quality English Spring Steel Wire,  
Nos. 1 to 34.

Steel Wire for Sewing Machine Needles and for other Purposes,  
**French Cold Rolled Sheet Steel,**

Sizes, 22 to 36 Gauge.

**Jewelers', Engravers' & Mechanics' Tools.**

The only Agents in the United States for

**HUBERT'S CELEBRATED FRENCH EMERY PAPER.**  
For Millers' and Machinists' Use.

## W. F. SHATTUCK & CO.,

113 Chambers and 95 Reade Street, New York.

MANUFACTURERS OF AMERICAN HARDWARE.

Cox & Tuff's Pat. Wrenches. Mouse Traps. Wire Selves. Yaw's Cow Bells.  
Axe, Pick, Sledge & Hammer. Scale Beams. Patent Tap Borers. Axes, Picks and Hatchets.  
Hammers. Crow Bars.  
Hatchets. Auger, Chisel & File. Tool Chests. Climax Horse Collars. Boring Machines.  
Hammers. Cast Iron Hatchets.  
Mallets. Pat. Boot Jacks. Brandage Horse Nails. Coffee Mills.  
Gimlets and Gimlet Bits. Moore's Wrt Iron Goods. Star Steel Spoons.  
Augers and Auger Bits. Shattuck's Platform Counter Scales. Stocks and Dies.  
Cocoa Nut Dippers.

**TURNER, SEYMOUR & JUDDS.**

MANUFACTURERS, IMPORTERS AND DEALERS IN

**Hardware and Upholsterers' Brass Goods.**

SOLE AGENTS FOR

**L. L. Davis' Patent Levels, Stevens' Calipers and Dividers,**  
**Page's Auxiliary Jaws.**

Manufacturers of Judd's, Prindle's and Combination Patent Curtain Fixtures, Locks and Curtains' Patent Raisin Seeder, Patent Twine Boxes, Picture Nails and Hooks, Escutcheon Pins, Coat and Hat Hooks; also Miscellaneous Iron and Brass Goods.

Small Brass and Iron Castings made to order.  
64 Duane Street, NEW YORK.

## ALFRED FIELD & CO.,

Foreign Hardware  
Commission Merchants.

PRINCIPAL OFFICES,

Birmingham, England, Nos. 66 & 67 Parade.

Sheffield, England, No. 23 Westfield Terrace.

New York, U. S., Nos. 47 John and 5 Dutch St.

BRANCH OFFICES,

Philadelphia, Cincinnati, New Orleans and  
Montreal.

Shipping Office,

Middleton Building, No. 1 Rumbold St.,  
Liverpool.

## VAN WART, SON & CO.

Hardware Commission Merchants,  
BIRMINGHAM, - ENGLAND  
AGENTS

**VAN WART & McCOY,**

48 Chambers Street, New York.

**GEORGE H. GRAY & DANFORTH,**

48 India Street, Boston.

**F. W. TILTON,**

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for the  
**John Rimmer & Son's Celebrated**  
**Harness and other Needles.**

**OSCAR IRVING VAN WART & Co.**

FORWARDING AGENTS,

2 South John Street, LIVERPOOL

## SCHOLEFIELD GOODMAN & SON,

(Formerly JOSHUA SCHOLEFIELD & SONS.)

GENERAL

**Hardware Merchants,**

BIRMINGHAM, - ENGLAND.

Agents and Sample Rooms.

New York—Edward Frith, 16 Cliff Street.

Boston—H. L. Richards, 18 Battery March Street.

New Orleans—R. Rhodes, 71 Camp Street.

Montreal—J. J. Evans 14 St., John Street.



Putnam's Government Standard

FORGED

**HORSE SHOE NAILS.**

Manufactured from the best of NORWAY Iron, and warranted to give entire satisfaction.

**S. S. PUTNAM & CO.,**

NEPONSET, MASS.

**Clement & Hawkes Mfg. Co.,**

Manufacturers of

**SHOVELS,**

Planters' Hoes, Trowels and Machinery,  
Northampton, Mass.

Send for Circular and Price List.

**HURD'S HURD'S HURD'S**  
**RAZOR BLADE AXES**  
MANUFACTURED FROM THE  
BEST ENGLISH EXTRA  
CAST STEEL  
BY THE  
JOHNSONVILLE  
AXE MFG.  
CO.  
**LANE, GALE & CO.**  
TROY, N.Y.

## G. W. Bradley's Edge Tools.

Butchers' Cleavers,

Bush Hooks, all patterns,

Furpentine Tools, all kinds,

Coopers' Tools, a specialty,

Ship Carpenters' Tools,

Axes and Hatchets,

Grub, Garden & Planters' Hoes,

Mill Picks, Mattocks & Picks

Box Scrapers & Chisels,

Cotton Hooks & Samplers.

**N. WEED. 37 Chambers St.**

## FERNALD & SISE,

100 Chambers Street, NEW YORK.

HARDWARE MANUFACTURERS' AGENTS,

REPRESENT:

Reading Hardware Co.

Crooke & Co.

Yerkes & Plumb.

Hartle, Wiler & Co.

Vulcan Horse Nail Co.

Walsh & Bro.

Moran & Sons.

Barnes & Deltz.

Nashua Lock Co.

Arande File Works.

William McNeice.

Langstroth & Crane.

Keystone Manufacturing Co.

A. E. Young.

Underhill Edge Tool Co.

Plumb, Burdick & Barnard.

Hotchkiss, Tuttle & Co.

Klein, Logan & Co.

T. T. Rhodes.

Orleans Scythe Stone Co.

Lakin Manufacturing Co.

## JAMES C. HAND & CO.

COMMISSION MERCHANTS,

No. 614 & 616 Market Street,

PHILADELPHIA.

AGENTS FOR:

William Penn, Reading and Norristown Pig Iron.

Reading Iron Co.'s (Crescent Brand) Nails, Boiler Flues, &c.

Bar Iron, Plow Steel and Iron, South Eastern Iron Wire.

Wm. Jessop & Sons' Steel and Norway Nail Rods.

Barrows, Savery & Co.'s Hollow Ware Castings, &c.

Fisher & Norris' "Eagle" Anvils and Vises.

Washington Mills Emery.

Heavy Hardware, &c., &c.

WELLS W. LEGGETT.

LEVERETT L. LEGGETT.

## LEGGETT & LEGGETT,

Patent Attorneys and Solicitors of Patents.

WASHINGTON, D. C.,

Give special attention to securing American and Foreign Patents for Inventors, Reissues and Extensions of Patents; also, to the taking up and prosecuting of Rejected Cases, Interferences, Infringements, Appeals, etc

We prosecute cases before the Patent Office & in the different Courts.

Correspondence promptly and carefully attended to.

Over 50,000 Sold.

**BAILEY'S PATENT**  
**Adjustable Planes.**

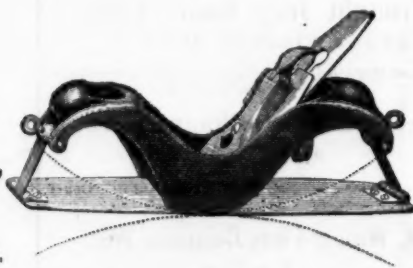
Manufactured by the

**Stanley Rule & Level Co.,**

NEW BRITAIN, CONN.

Sold by all Hardware Dealers.

Warehouse, 55 Chambers St., New York.



## Greenfield Tool Co.,

Sole Manufacturers of the celebrated

**"DIAMOND" PLANE IRONS,**

Of uniform temper, and will hold a fine cutting edge; with solid steel caps, and fully warranted.

AND THE

**Patent Machine Forged Ox Shoes,**

Better and cheaper than any hand made shoe, universally liked, and always used after one trial. Also

**BENCH AND MOULDING PLANES** of every description.

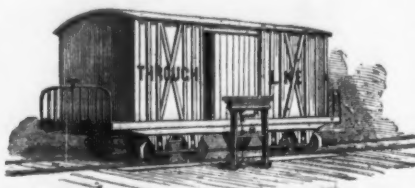
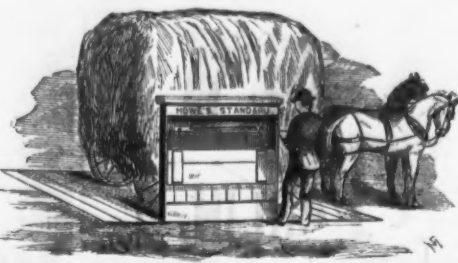
Address, for Illustrated catalogue and prices,

**GREENFIELD TOOL CO., Greenfield, Mass.**

Warehouse in New York, 37 Chambers Street.







## HOWE'S STANDARD SCALES. SAMPSON STANDARD SCALES.

Weighmasters' Beams and Frames. Trucks of all varieties.

All descriptions and sizes of these articles are made by the

**Brandon Mfg. Company, at Brandon, Vt.**

And sold by their Agents in all the leading cities and towns of the country.

The Scales made by this Company possess valuable *patented improvements* over all others. They have taken more first-class Premiums than all others during the past ten years. The Brandon Manufacturing Company guarantee all goods made by them to *prove satisfactory and superior to any other make.*

Call and examine their goods, or send for Circulars and Price Lists to

**The BRANDON MANUFACTURING CO., BRANDON, VT.,**

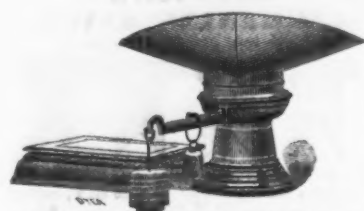
Or their Warehouses and at the following places:

### AGENTS.

PAGE & CO., 3 Park Place, New York.  
E. H. SOUDER, 1021 Market St., Philadelphia, Pa.  
W. A. MCLURG, 63 Wood St., Pittsburgh, Pa.  
SPEAR BROS., 21 S. Charles St., Baltimore, Md.  
W. M. BIRD & CO., Charleston, S. C., and Savannah, Ga.  
FOLGER & COMPANY, 37 & 39 Magazine St., New Orleans, La.  
BRANDON SCALE CO., 53 Sudbury St., Boston.  
W. A. DOBSON & CO., 86 Main St., Buffalo, N. Y.  
HEART & CO., 181 River St., Troy, N. Y.

### AGENTS.

LYMAN, DORNEY & Co., 116 Main St., Cincinnati, O., St. Joseph, Mo.  
A. M. GILBERT & CO., 38 State St., Chicago, Ill.  
BUHL, DUCHARME & CO., Detroit, Mich.  
ARNOLD & YALE, Milwaukee, Wis.  
KINGMAN & CO., Peoria, Ill.  
JOHN T. EDGAR, Omaha, Neb.  
GILBERT, WEEKS & CO., 11 South Main St., St. Louis, Mo.  
V. S. W. PARKHURST, 318 Pine St., San Francisco.  
EVANS & SON, 14 St. John St., Montreal, C. E.



With one Square and one Round Platform.

## Grindstones, Emery, &c.



**J. McDERMOTT & CO**

MINERS AND MANUFACTURERS OF GRINDSTONES.

Black River, Independence and Berea Grills.

**BUILDING STONES**

of every description, from the above quarries.

OFFICE, National Bank Buildings, Cor. Superior and Water Sts. CLEVELAND.

## Walter R. Wood, GRINDSTONES

283 FRONT STREET,

NEW YORK.



THE UNION STONE CO.

Patentees and Manufacturers of

Emery Wheels,

Oil Stones, and Emery

Blocks.

To order, in size and form to suit various mechanical uses. Grinders, Saw Gums, Diamond Tools, and Wood's Patent Knife Grinders for Planing, Paper Cutting, Tobacco, Leather-Splitting and other Long Knives. Also, Mill Stone Cement.

16 Exchange Street, BOSTON, MASS.

Branch Offices, 25 Liberty Street, NEW YORK.

25 Commerce St., PHILADELPHIA.

Send for Circular.

## Ford's Pat. Stove for Heating Air for Blast Furnaces

Adopted at 13 different Furnaces.

## West Point Foundry,

Cold Spring, N. Y.

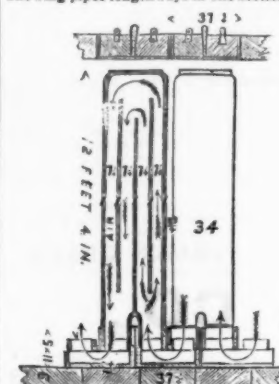
## PAULDING, KEMBLE & Co.

30 BROADWAY, NEW YORK, sole Proprietors for the United States

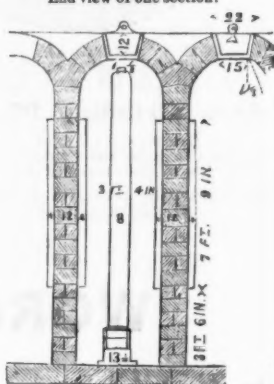
**JOSEPH CRAMPTON, Agent,**

23 19th Street, Pittsburgh, Pa.

Showing pipes lengthways in one section.



End view of one section.



### REFERENCE.

PHILADELPHIA, Nov. 16, 1872.

PAULDING, KEMBLE & CO.:

GENTLEMEN: We have five sections of the "Ford's" Ovens in use since blowing in our new Furnace on the 21st of October. The Ovens have given entire satisfaction; we consider them superior to any Cast Iron Oven in use; they heat the air to a greater degree with much less gas and heat on the brickwork than the Player Ovens; they cost less for construction, and, we believe, will prove more durable, and less expensive to keep in repair. Our main difficulty thus far has been to keep the heat down to 1000 deg.; our average is from 1100 to 1200 deg.

In all cases the Cast Iron Key Boxes to form the arch should be filled lightly with fire-brick blocks, laid dry and covered with loam, or, better, a cast iron plate, to cover the top, with a ring in it, so as to be easily removed.

We built our ovens in one block, entirely of fire brick; the cost of the brick work entire was about 5000 dollars, say about 1000 for each oven.

We put 4 courses of fire-brick in the bottom, laid on a loose slate rock, laid dry, and well grouted each course with Kaolin grout.

We can recommend the Ford Ovens with great confidence to iron men who wish to construct the best kind of ovens in use in the United States. Yours, truly, J. B. MOORHEAD & CO.

P. S.—Our Furnace is now on her 3d week, making about 28 tons per day good Foundry Iron—15 feet base, 50 feet high.

## NEW YORK SCREW BOLT WORKS.

(Estate of R. J. DEWHURST, deceased.)

**JOHN COCHRANE, Executive Agent and Manager,**

Office and Works, cor. Ave. D and 11th St., N. Y.

**Bolts, Nuts, Turnbuckles, Washers, Forgings, &c**

The attention of large consumers solicited.

## OTIS FURNACES & MINES.

New Union Steam Safety Elevator,

How One Works.

RIVERSIDE IRON WORKS, DEWEY, VANCE & CO., Wheeling, W. Va., January 14th, 1873.

Messrs. OTIS BROTHERS & Co., New York.

Dear Sirs: The experience of a year proves that your Furnace Elevator is superior to all others in use. We have in the six weeks from December 1st to Sunday last, 19th inst., made 2724 tons, 1401 lbs. Pig Metal, or an average of near 65 tons per day, which required the elevator to lift 72 feet high 45 tons Ore, Coke and Limestone for each ton of metal produced, or more than 11,500 tons material in the 6 weeks. The largest yield in one day was 81 1/2 tons Iron, involving the lifting of 345 tons material in 24 hours. This has all been done to our satisfaction, and that, too, in the coldest weather we have had. Other furnaces with water and pneumatic hoists have experienced great difficulty, on account of the water freezing in the tanks; and in the case of the air hoists, we understand that two furnaces, not far from us, had to "blow out," from being unable to hoist stock during the "cold snap." The difficulty, we are told, was caused by the condensed moisture in the blast freezing to the sides of the cylinders, so that the piston could not move up or down.

Very truly, yours,

DEWEY, VANCE & CO.

Send for Circular to

**OTIS BROTHERS & CO.,**

348 Broadway, NEW YORK.

### BUSINESS ITEMS.

#### NEW YORK.

The Buffalo Steam Gauge Company is filling a second order for 1000 gauges for the Westinghouse Air Brake Company. Beside gauges, the company turns out from 40 to 50 headlights monthly, beside lanterns, cab lamps, &c.

John Daly, president of the Albany Union Foundry Company, has made application that the company be dissolved. The application is based on the fact that the company are now without the means of proceeding in the business in which they were engaged, as their buildings have been sold under mortgage foreclosure, and that they are not now the possessors of any real estate. It appears from the petition, also, that the company ceased to manufacture stoves or iron ware in 1871, and the time intervening has been devoted to the selling of the stock on hand. There were one hundred and two stockholders in the company, representing in the shares owned by them a capital of \$86,600. The asset of the company at present are \$5100-07, principally money in bank, and the debts due \$121.

#### NEW JERSEY.

Hammered and rolled cast steel are the specialties of the Newark Steel Works. The company employ ninety men and intend increasing the capacity of their mills. They use four steam hammers, three trains of rolls and four engines in their establishment, and their products have gained for them an excellent reputation.

#### MASSACHUSETTS.

Kilburn, Lincoln & Co., Fall River, manufacture turbine water wheels, cotton looms, shafting, calendars, mangles, hydraulic presses, machinists' tools, steam engines, pipe, heavy castings, and a general assortment of machinery. They employ 200 hands, whose pay amounts to \$10,000 per month.

The business of the Lamb Knitting Machine Company, at Chicopee Falls, is steadily increasing, and the company have now on hand numerous orders for their machines from Japan and Germany; their home orders are also extensive for this season of the year.

#### MAINE.

The Evans Rifle Manufacturing Company, Mechanics Falls, a new organization, will commence the manufacture of guns at once at A. C. Denison & Co.'s machine shop. Almost all the capital stock, \$200,000, has been subscribed.

The scythe factory of Hiram Holt & Co., at East Wilton, will, the present season, turn out about 4000 dozen of scythes, which are shipped to all parts of the country. The company annually consume, in the manufacture of the above, about forty tons of iron and ten tons of steel. They are also engaged in the manufacture of the "Lightning Hay Knife," of which they make about 500 dozen yearly, using some ten tons of iron and ten tons of steel for this class of product. There are twenty-six hands employed in the establishment, who receive monthly \$1400 for their services.

The Northville Scythe Factory, at Newport, is to be enlarged and improved.

#### PENNSYLVANIA.

The works of the Oxford Co-operative Car Company, at Oxford, are rapidly approaching completion, and work will be commenced on cars in a few weeks. The company has already orders on which to commence. It will construct passenger and freight cars, and is said to have secured a large number of experienced workmen, and to have unusual facilities for shipping cars.

A new merchant iron mill has been erected at Milton, by the Milton Iron Co., which is now in successful operation. W. R. Jenkins, Esq., is president, and P. C. Johnson, Esq., treasurer, of the company.

Another new blast furnace is talked of in progressive New Castle.

The Lehigh Register, of August 13, says: A project is on foot to add a nail mill to the Glen Iron Works, in this city, and last week, at the American Hotel, a meeting of capitalists was held to consider a new patent nail machine, and the advisability of adopting it. Mr. H. H. Fisher was elected chairman, and Mr. E. S. Schimer, secretary. A gentleman from Philadelphia was present and explained the superiority of the new machine over the old ones in use, and how nails can be made cheaper by it than by any other. After the matter was thoroughly discussed a committee of five was appointed to go to Philadelphia next week and visit various nail mills and ascertain what kind of nail machines manufacture the cheapest and best. This committee will report, and then definite action will be taken regarding propositions between the men who will supply the money for the enterprise and the patentees of the nail machine, and an offer on the part of the Glen Iron Company will be considered. The committee consists of Samuel Lewis, H. H. Fisher, Col. T. H. Good, A. G. Renninger, and John Grub.

The Pittsburgh, Fort Wayne and Chicago Railway shops, in Pittsburgh, turn out two complete locomotives per month. They have five-foot driving wheels, and are splendid specimens of workmanship. The company now makes all its own locomotives.

Everything works smoothly and satisfactorily in the new sheet mill at New Castle.

#### CONNECTICUT.

The Chapin Machine Co., New Hartford, have just completed a new machine for heading tire blanks and rivets, which will head 50,000 rivets per day. The machine is automatic, taking the wire from the roll. The company employs from 50 to 70 hands, and make a specialty of bolt machinery.

The Pratt & Whitney Co., of Hartford, are at the Vienna Exposition with 13 machines. The Prussian government is now ordering its new gun-making machinery from this firm to the amount of hundreds of thousands of dollars.

The Norwalk Lock Works give employment to from 300 to 400 hands.

Sharpe's Rifle Manufacturing Co., Hartford, are working only one-fourth of their capacity upon their military and sporting arms.

The Yale Iron Works, at New Haven, have an order for a pair of very fine engines, with condensers, and all the machinery for a steam yacht for the vice consul of Austria.

The factory of the Washburn Car Wheel Co., at Hartford, is manufacturing 30 steel rimmed wheels daily. The company have now on hand more orders than they can fill in the next six months. The wheels are giving the utmost satisfaction.

#### RHODE ISLAND.

The Providence Nickel Plating Company was organized at Providence, in 1870, and is now one of the largest establishments of the kind in the country. The company has recently taken possession of new and spacious quarters in Fulton Block, Fulton street, where they employ a large number of hands and operate a Baxter steam engine. All kinds of nickel plating work are done by the company, which in the three years of its existence has won an extended and enviable reputation. The members of the association are practically skilled in the business and personally superintend all its processes.

#### OHIO.

The Wrought Iron Bridge Company, at Canton, turn out 125 feet of work per day, employing 100 persons in manufacturing the same. The bridges constructed by this company are of spans, varying from 20 to 350 feet.

The Valley Rolling Mill, Youngstown, has recently increased its facilities for the manufacture of railroad iron, by erecting four new puddling furnaces, two new heating furnaces, and making other additions. The mill is doing a prosperous business.

The Ohio Iron Company, Zanesville, was established 30 years ago, and manufacture pig, bar, hoop and angle iron, light T rails, and railway spikes and axles. The company manufacture 12,000 tons of pig iron and 5000 tons of finished iron per year. They are now erecting a new warehouse 48x50 feet, two stories high, of brick, and are also breaking ground for a finishing mill for 8 to 10-inch rails, the dimensions of the mill to be 80x166 feet. It will be completed by October 1st. The engine will be built by H. & F. Blandly, and is to be 130 horsepower.

A company known as the Union Bridge Company has been organized at Toledo, and has obtained permission from the Board of Public Works of that city to build a bridge over the Maumee River, from a point on the present railroad grounds a short distance below the Lake Shore bridge to a connection with the Toledo, Tiffin and Eastern Road, on the east side. The bridge will enable direct connection to be made between all the roads entering the city. The stockholders in the company are the Toledo, Wabash and Western Railway Company, the Canada Southern Railway Company and the Pennsylvania Company.

The Silicon Steel Works have just erected extensive buildings at Sandusky, and the works will probably get into operation about September 1st. The company will run six puddling and seven heating furnaces. The capacity of the works will be 55 tons per day. Sandusky parties subscribed \$150,000 to the stock. This company also have extensive works at Rome, N. Y.

#### MICHIGAN.

The blast furnace at Elk Rapids went into blast several weeks ago. This is a charcoal furnace 12 feet at bushes and 48 feet high, with bell and hopper top. When the full blast is put in it is thought the production will be from 25 to 30 tons per day.

Beauregard, Matthews & Co. are enlarging their agricultural implement works at Battle Creek, by building two additions, which connect all their buildings in one.

#### ILLINOIS.

Fraser, Chalmers & Co., of Chicago, in 1871, succeeded to the business of the Eagle Works Manufacturing Company, which was established as far back as 1843. Since then the five-story building, 160x60 feet, now occupied as their manufactory, has been erected. They turn out an average of 104 boilers and 40 engines a year, and employ 125 men. Their business is largely the manufacture of mining machinery, of which they have sent 600 tons to Colorado and 700 tons to the Lake Superior fields. The amount of iron consumed annually is about 6000 tons.

### Vienna Premiums and Sewing Machines.

We copy the following from the New York Herald of August 12th:

"THE REGION OF THE SEWING MACHINES.

"If Dante had been gifted with the spirit of prophecy he would have set apart a region in his inferno to illustrate the rivalries and emotions of the sewing machine manufacturers of the United States. The conflicts, the misunderstandings, the ambitions, the yearnings for approbation and notoriety, the odd, incessant efforts to win medals of progress and renown and merit and honor, which inspire the gentlemen who manage this industry, have given constant motion and life to the American department. So when His Majesty came into the sewing machine department every effort was made by our commissioners to introduce him to each specific machine and explain its peculiar qualities. Let me give you a list of the machines in the catalogue, so you may know what His Majesty was asked to do. First, the Howe Machine Company, New York; then the Singer Manufacturing Company, New York; the Whitney Sewing Machine, Paterson, N. J.; the Wheeler & Wilson Sewing Machine Company, New York; the Wilson Sewing Machine Company, Cleveland, Ohio; the Wilcox & Gibbs Sewing Machine Manufacturing Company, New York; Ezra Morrill & Co., Derby Line, Vt.; George N. Bacon & Co., London, England; the Weed Sewing Machine Company, Hartford, with the patent effective stop motion of Fairchild's attachment; the Seacor Sewing Machine Company, New York; the McKay Sole and Shoe Machine, Cambridge; the Universal Feed Sewing Machine Company. Every exhibitor expected a special visit from the Emperor, and His Majesty, with a patience and courtesy that should be commended, endeavored to visit them all.

"After waiting a few minutes to comprehend the explanations made to him of the advance of the industry so largely represented in America, the Emperor continued his tour of the other departments, especially inquiring of his attendants what different principles were presented by each separate machine, in what respect one machine differed from the other—all of which was explained to him, especially the new principle of the patent stop, or the application invented by Mr. Fairchild, and now owned by the Weed Machine Co., by which the action of the needle is arrested by the pressure of a spring without stopping the motion of the wheel."

In the New York Herald of August 19th we find awards were made as follows:

"To the Wilson Sewing Machines, of Cleveland; Elias Howe Sewing Machine Company, for sewing and stitching. Wilcox & Gibbs Sewing Machine Company, of New York, for best single thread sewing machine. The Weed Sewing Machine Company, for best stop motion applied to sewing machine treadles. The Wilson Sewing Machine Company being the only exhibitor that received a grand prize medal for the best sewing machine, and medals of honor."



# HENRY DISSTON & SONS'

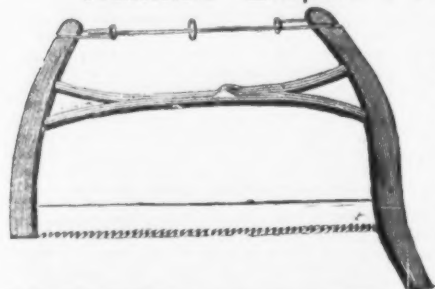
## SAW, TOOL,

## STEEL AND FILE WORKS,

Front and Laurel Streets,  
PHILADELPHIA, PA.

### Hankins' Elliptic Forked Saw Frame.

Patented June 28th, 1870.



The annexed engraving represents HANKINS' ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Frame being all in one piece, without any centre bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

**HARVEY W. PEACE**  
VULCAN SAW WORKS,  
WILLIAMSBURG, N. Y.

## AMERICAN SAW CO.,

No. 1 FERRY STREET, NEW YORK.



Solid saws require frequent gumming, thereby subjecting them to risk of springing or breaking. This is especially the case with cross cuts having Patent Teeth. In the perforated saws all gumming is avoided, and the teeth are easily kept long and in proper shape, saving files, labor, expense and vexation. As is well known, our saws cut faster, smoother and easier than any other.

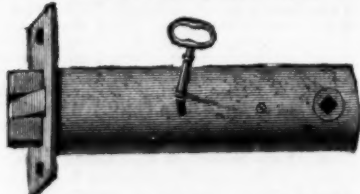
### MOVABLE-TOOTHED CIRCULAR SAWS AND SOLID SAWS OF ALL KINDS.

**W. ROSE & BROTHERS**  
WEST PHILADELPHIA,  
Manufacturers of

**Plasterers' and Brick  
Trowels**  
Hammers and Chisels.

Also,  
Saddlers' Round Knives, etc.,  
N. E. cor. 36th & Filbert Sts.  
Please send for Price List.

**Schweitzer Mfg. Co.,**  
57 Reade Street, New York.

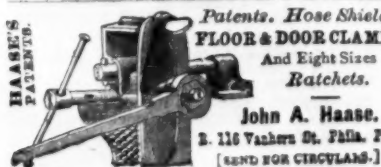


**CONTINENTAL LOCKS,**  
Made of Wrought Iron or Brass, very superior in quality, and only an auger used in mortising.

**EXCELSIOR PAD LOCKS,**  
COMPASSES,  
DIVIDERS,  
ALL WITH

**STUBS' STEEL POINTS,**  
Best and Cheapest Goods in the market. Sole Agents for the United States for  
**NEWBOULD'S FILES AND TOOLS.**  
French Coffee Mills.  
**NOBLE MFG. CO.,** Tools, Ship Augers, &c.  
Emery, Waterhouse & Co., Shovels & Spades.

We also make a superior  
**AXE**, "Queen of the Forest," &c.  
Disston's Saws. (Largest Stock in the City.)  
General dealers in  
**FOREIGN & DOMESTIC HARDWARE.**



**John A. Haase,**  
3. 116 Vashers St. Phila. Pa.  
[SEND FOR CIRCULARS.]

## VIENNA PREMIUMS.

**THE WILSON SHUTTLE  
SEWING MACHINES**  
Received the Grand

**PRIZE MEDAL**  
AND MEDAL OF HONOR  
FOR THE

**Best Sewing Machine**  
The Best made Sewing Machines,  
And Three

**Co-Operative Medals**  
FOR  
The Best Made Set of Harness,  
The Best Made Side Saddle,  
The Best Boot and Shoe Work,  
And the Best Samples of  
Cloth Sewing.

No other Sewing Machines received Premiums on their merits, which we will prove by evidence at our office, and that all reports relating to the contrary are false.

**AGENTS WANTED,**  
**WILSON SEWING MACHINE CO.,**  
707 Broadway, New York,  
And all other cities in the United States.

**ALWAYS COOL  
STOVE LID LIFTERS.**



Cast in one piece, with improved  
**VENTILATED HANDLE.**  
Manufactured only by  
**G. B. WALBRIDGE, 55 Chambers Street N. Y.**



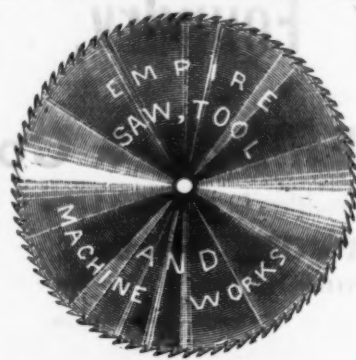
## H. W. PEACE,

MANUFACTURER OF

## SAWS OF ALL KINDS.

FACTORY, WILLIAMSBURG, N. Y.

**JAMES ECCLES,**  
ENGINEER  
and General Machine Maker,  
2423 2425, 2427 Lombard St., Philadelphia, Pa.



MANUFACTURERS OF  
**SAWS OF ALL KINDS.**  
**Saw Grinding Machinery**

Of the most approved make, on hand and for sale; warranted to grind either straight or to any given taper or level. Sole maker of the  
**Quadruple Screw Power Press.**  
General Machine Work executed to order.



I make a specialty of the LARGEST SIZES of Circular Saws, and call particular attention of lumber manufacturers to the following points of excellence:  
**Evenness of Temper.**—The peculiar structure of my forams subjects all parts of the saw to a DEAD heat, and when dipped in the oil bath secures perfect uniformity.  
**Perfect Accuracy in Thickness.**—My saws are ground on a patent machine, automatic in its operation, grinding off the thick places upon the plate before the thinner parts are reached, and when the saw is removed BALANCES PERFECTLY, which is proof positive of the right accomplishment of the work.  
**Properly Hammered.**—Great care is taken that no saw shall leave my works without due attention in this important particular. A saw too tightly strained upon the rim, or too loose in the center, cannot be successfully run—hence the importance of so hammering the saw as to effect equal strain in all its parts, and at the same time RUN TRUE. This department is under the personal supervision of myself, who has devoted over twenty years to the art of saw making.  
I am sole proprietor and manufacturer of the celebrated "Challenge" Cross-Cut Saw. Price Lists of all kinds of saws sent on application.

**JAMES OHLEN.**

## WORRALL & CO.,

MANUFACTURERS OF

## EXTRA CAST STEEL SAWS,

Plastering Trowels, Tools, &c.

Saw Manufactory, Iron Foundry & Machine Shops, ELIZABETHPORT, N. J.  
Office and Warerooms, 28 Elm Street, New York.

**J. FLINT & CO.**  
Manufacturers of all kinds of **SAWS AND PLASTERING TROWELS.**  
ROCHESTER, N. Y.

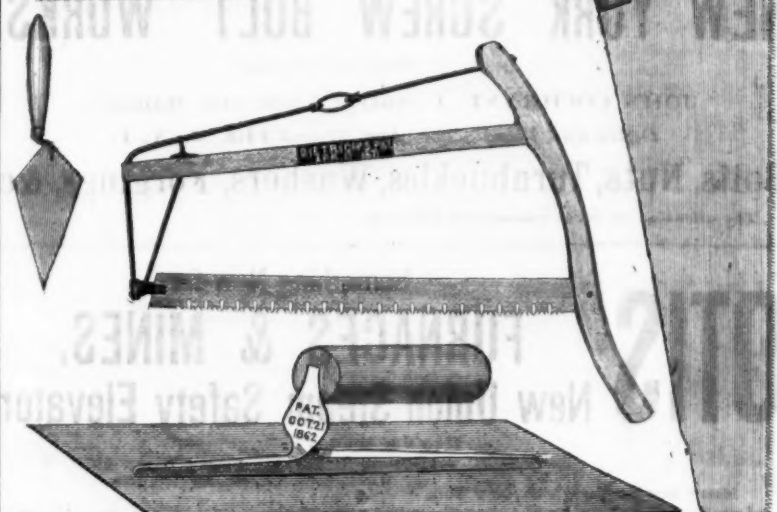
**Dietrich's Patent Wood Saw.** Guaranteed the strongest, lightest, easiest to strain or tighten and best braced wood saw made; also to give perfect satisfaction.

**Dietrich's Patent Double Handle Rip Saw.** All will readily see the benefit of this useful invention.

**J. Flint's Patent Plastering Trowels.** The best made and finished Trowels in the world. We make four grades of Plastering Trowels, from the best to the cheapest.

Our patent method of grinding hand saws makes them superior to any in the market.

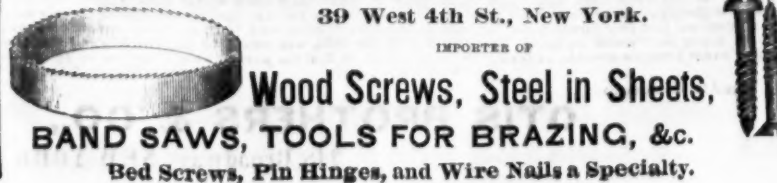
Send for Illustrated Price List.



## GEORGE GUEUTAL,

39 West 4th St., New York.

IMPORTER OF



**Wood Screws, Steel in Sheets,**  
**BAND SAWS, TOOLS FOR BRAZING, &c.**  
Bed Screws, Pin Hinges, and Wire Nails a Specialty.



**BOYNTON'S  
LIGHTNING SAWS.**  
Awarded the Medal of the American Institute, 1872.



Two Direct Cutting Edges, instead of one Scraping Point. Note extra steel and durability over the old V, outlined on M tooth.

A Challenge of \$500, toward expense of a public test, to prove that the Lightning Saws excel all others in Speed, Ease, and Simplicity, has been offered since 1870, and has never been accepted. More than 100,000 Lightning Saws were sold during the year 1872, the purchasers of which testify to their superior merits.

Our leading papers, such as the *Tribune*, *American Agriculturist*, *Christian Union*, etc., have published over sixty editorial notices recommending these Saws. Farmer's Clubs, Lumbermen, and Hardware Dealers unite in pronouncing the genuine Lightning Saw the greatest labor-saving implement of the age.

I have hundreds of letters from practical sawyers, voluntarily written, expressing their entire approval of these Saws. Where the Hardware Trade do not sell the Lightning Saw, I will send a 5-foot cross-cut and a buck saw blade on receipt of \$1.

For Catalogues and additional information, address  
**E. M. BOYNTON, 80 Beckman St., New York,**  
Sole Proprietor and Manufacturer.

## WM. McNIECE,

## Excelsior Saw Works.

515 Cherry St., Philadelphia.

Manufacturer of  
**Extra Cast Steel Saws** of every description,  
**Pat. Screw Socket Pole Pruning Saws,**  
**Patent Screw Socket Edging Knives,**  
**Patent Screw Socket Scuffle Hoes, and**  
**Patent Screw Socket Paper Hang-**  
**ers' Scrapers,**  
**Mowing Machine Sections** of all patterns  
constantly on hand.

## E. C. ATKINS & CO.,

Indianapolis, Indiana,  
**Saw Manufacturers.**

Best Cast Steel Patent Ground Saws.  
Also, sole Manufacturers of Atkins' Patent



**CROSS-CUT SAW HANDLE.**  
Best Patent Handle in use.  
Manufacture and Office—Nos. 210, 212, 214 and  
216 South Illinois Street.

## WHEELER, MADDEN & CLEMSON,

Manufacturers of Warranted Cast Steel

## SAWS

of every description,  
including

Circular, Shingle, Cross Cut,  
Mill, Hand, Roberts' and  
other Wood Saws,  
&c., &c

## Cast Steel Files

of the well known brand of

**Wheeler, Madden & Clemson.**  
FACTORIES:

**Middletown, Orange Co., N. Y.**

BRANCH OFFICE:

**97 Chambers Street, New York.**

## BRUNDAGE FORGED HORSE NAILS,

Manufactured from

**BEST NORWAY IRON,**  
by **BRUNDAGE & CO.,** Sold by  
**WHEELER, MADDEN & CLEMSON.**  
**Middletown, Orange Co., N. Y.**



## Cutlery.

**Landers, Frary & Clark,**  
New Britain, Conn.,  
MANUFACTURERS OF

# TABLE CUTLERY

OF EVERY DESCRIPTION. ALSO.

## General Hardware,

IN VERY GREAT VARIETY.

298 BROADWAY, N. Y.

**HENRY DICKINSON,**  
**Sheffield Cutlery, Files, &c.,**

66 &amp; 68 READE STREET (near Broadway), NEW YORK.

Manufacture, SHEFFIELD, ENGLAND.

Isaac Milner's Fine Pocket and Table Cutlery.  
Howard Bro.'s Medium Pocket Cutlery.  
J. B. Osberton & Co.'s Medium Table Cutlery.  
Isaac Milner's Razors, Butcher and Hunting Knives.  
Hargreaves, Smith & Co.'s "Imperial" Files.  
Milner's "X" and Collins' "IXL" Hand Saws.

## ROWE & POST,

MANUFACTURERS OF

**Shears, Trimmers, Scissors, &c.**

No. 120 Chambers and 50 Warren Streets,

TRADE MARK.  
J. Rowe's XL.

NEW YORK.

TRADE MARK.  
Etna Shear Co.

Send for Catalogue.

**JOSEPH S. FISHER,**  
No. 411 Commerce St., PHILADELPHIA,

AGENT FOR

**George Wostenholm & Son,**  
Washington Works, SHEFFIELD,

**Celebrated I-XL Cutlery, Razors, &c.**

SOLE AGENT FOR THE UNITED STATES OF  
**WALTER SPENCER & CO.,**  
Steel and File Manufacturers,  
Rotherham, ENGLAND.

Corporate Mark.

W. SPENCER  
ROTHERHAM

Granted 1777

**Nixon & Winterbottom,**  
PYRAMID WORKS, Sheffield, Eng.

Manufacturers of Table Cutlery, Butcher Knives,  
Bread Knives, &c. By patent and Improved Ma-  
chinery. Agents: U. S. Smith & Hall, 58 & 60 Reade  
St., N. Y.; Canada, Thos. Ellis & Co., Sheffield, Eng.

**RICHARD A. TURNOR,**  
37 Chambers St., New York,

Agent for

**F. W. HARROLD,**  
Hardware Commission Merchant,  
BIRMINGHAM.

**JOSEPH ELLIOT & SONS,**  
Manufacturers of Razors, Table Knives, &c.,  
SHEFFIELD.

**AMERICAN**  
**PEN AND POCKET KNIVES,**

MANUFACTURED BY **PEPPERELL,**  
Aaron Burkinshaw, MASSACHUSETTS.

My Blades are forged from the best Cast Steel, and  
warranted. To me was awarded the GOLD MEDAL of  
the Connecticut State Agricultural Society; also a Medal  
and Diploma from the Mass. Mechanics' Ass'n, Sept., 1861.

**Thomas Taylor,**  
43 Chambers Street, New York.

Agent for

**HENRY H. TAYLOR,**  
**SHEFFIELD CUTLERY,**

**Graining Combs.**

Sole Agency in the U. S.  
**JONATHAN CROOKES & SON'S**  
Celebrated Pen, Pocket and  
Sporting Knives.

Corporate Mark.

**AMERICAN KNIFE CO.,**  
Thomaston, Conn.,

Exclusive Manufacturer  
of  
**Steel's Pat.**  
**FOLDING RULE**  
**AND KNIFE.**

Also, Manufacturers of  
all kinds of  
**POCKET CUTLERY.**  
Chicago Agency, 123 State St.

**THE MILLER BROS. CUTLERY COMPANY,**  
Manufacturers of Patent

**FINE PEN AND POCKET CUTLERY,**  
WEST MERIDEN, CONN.

We warrant our Knives equal in cutting qualities  
and workmanship to any made. We also make  
**SILVER PLATED POCKET KNIVES,**  
which will not rust or become discolored when used as  
a Fruit Knife, and their cutting qualities are equal to  
any other Knife.

**CLARK, WILSON & CO., Agents,**  
41 Beekman Street, NEW YORK.

## CORRESPONDENCE.

PHILADELPHIA, Sept. 1, 1873.

The importance of the city of Philadelphia to the readers of *The Iron Age*, as the great center of manufacturing, has always made a weekly record of the current events in this city interesting to those engaged in the iron trade in the various sections of our country to which the paper goes. As such has been the case hitherto, there is every probability that with the rapid increase of production, and the stirring events likely to be crowded into the preparation for the Centennial Exhibition, matter of greater interest will be presented for the future.

Inasmuch as the best method of carrying out the plans for this Centennial Exhibition is now the subject of general discussion by the press of the whole country, it is fitting that the journals devoted to the interest of the iron trade should take a prominent part therein. The matter of raising the funds necessary for the successful conduct of the Exhibition may be safely left to the secular press; that subject is outside the pale of our discussion, but the duty of the iron manufacturers of the country in regard to the contributions of their products to the nation's display cannot be too strongly impressed upon them or too often urged.

## AMERICAN ORES.

With one or two exceptions, we have no treatise which has classified, located and thoroughly described the character or extent of the deposits of American ores, especially of iron. Fugitive papers upon the ores of various sections have been read before the scientific societies of the country, and are scattered through their proceedings, but the only approach to an all thorough description of the iron ores which is now extant is that by Prof. Lesley, of this city, and which was published in 1859, now fourteen years since. The necessity for such a treatise is patent, and especially for the coming Centennial, but would be incomplete without a collection of the various ores for exhibition, and their proper classification and analysis, and description of their various localities, with the extent of the deposits. It is to be remembered that we open our Centennial Exhibition quite as much to advertise our natural wealth, our mechanical ability, and our superiority—or inferiority—of production to the world, as to celebrate the one hundredth anniversary of our national existence. As we shall do the former, so shall we deserve and derive material benefit, increased capital, immigration and development from the heavy expenditure necessary.

The subject of collecting and classifying the ores of the United States was suggested to the Centennial Commission nearly a year ago, by Mr. J. Blodgett Britton, of this city, a metallurgist thoroughly competent for the task, and who only urged, in a spirit of patriotism and for the advancement of metallurgical science that the matter should be put in hand. The plans of Mr. Britton received the endorsement of the various iron associations, and of the majority of the manufacturers of the country at the time, but nothing definite has been done by the Commission to that end, apparently for fear of incurring expenditure. The matter now requires prompt and vigorous local action by individual and corporate mine owners, counties and State governments. It is the further simplified since the great ore deposits now supplying the majority of the furnaces of the country are in the hands of but few parties; all of whom who have taken the trouble to exhibit samples of their minerals at Vienna have received medals.

The time is very short for the proper performance of the work, and unless the winter shall see an effort made toward the object in view, the result will be barren.

In no portion of the iron trade is capital more wanted than in the manufacture of pig iron. We are regaled from time to time with accounts of pure pig metals, costing to make but \$14 to \$17 per ton on furnace banks, in Georgia, Alabama, and Tennessee, but we never find these irons, allowing liberally for freight charges, commissions, and a fair profit added, for sale in the seaboard markets. Foreign capital is seeking this country, and it only requires the proper exhibition of our possibilities to secure it for the iron trade.

That Pennsylvania will do her share of the exhibition of iron products there is little doubt, nor is it to be supposed that the city containing the largest locomotive works, car wheel works, and saw works, respectively, in the world, will fail to show their products on their own ground. It is, however, upon the many manufacturers of tools, of hardware, of stoves, agricultural implements, cutlery, engines, and all their iron corollaries, that we would urge the necessity of now resolving and planning the subject of exhibiting their best specialties at the Centennial, less than three years from us. A special department, to include an entire iron plant, from the ore to the finished steel tool or the Bessemer or Martin rail, the architectural column and the sectional iron ship, would do no more than justice to our progress, or be no more than a fair exponent of our abilities. Moreover, and this is business, our iron manufacturers must remember that if the much talked-of supremacy of the iron trade is to come to us in the near future, we must have customers from abroad, even to the antipodes, and that to secure such customers no better advertising medium will ever present itself than the Exhibition of 1876.

## PHILADELPHIA PROGRESS.

Locally, we are progressing surely and rapidly in internal works of use and decoration, included among which are several engineering works of considerable magnitude. Three new iron bridges of large size are being constructed across the Schuylkill River, the largest of which is in the hands of Messrs. Clarke, Reeves & Co., and while, like all their work, being well done, will be the most ornamental bridge in the country. The river front on the Delaware

is being improved by the Pennsylvania Railroad Company, and by the new year a continuous track will be laid along it, bringing the products of the West to the vessels without breaking bulk. In connection with this movement, is a proposition to entirely remove the Island fronting the center of the city, and thus give a superior harbor equal to the wants of our reviving commerce, and reviving it surely is, as witness the numerous and increasing lines of ocean steamships now trading from this port. The Reading Railroad Company is grading and preparing the ground at Port Richmond for a large iron shipyard, at which will be built a fleet of a hundred iron steam colliers, upon the plan of those now successfully used by that corporation. The Midvale Steel Works, formerly the Wm. Butler Steel Company, will in future, it is said, be under the management of William Sellers, Esq., who has made a world wide success of his iron specialty of machine tools, and who will doubtless revive the fortunes of this establishment, which has everything to be desired in the way of locality and plant to compel success. The general manufacturing trade of the city is good, and there is scarcely a works of any description here which has not devoted the dull summer months to improvements. The Peacock Iron Works of Messrs. A. & P. Roberts & Co. has just finished a new mill, doubling the former capacity of the works, and which will start at once, and greatly facilitate the production of their specialty of hammered and rolled axles, large rounds, &c.

The mill of Stephen Robbins, in Kensington, which has been thoroughly repaired and rebuilt is about resuming, and the blast furnace now being built by the same owner is approaching completion. A new blast furnace has been proposed, to be located at Point Breeze, on the Schuylkill, but may be delayed by dull times. Of the iron trade much might be said; that there is a certain improvement and greater inquiry is clear, but prices very little, and the margin of profit, as is well known to all, is infinitesimal. The natural result of the rapidly increased production of a given article creating a demand for another, is exemplified in the case of the late developments in the oil region, which have so increased the product of Petroleum as to reduce the price to 81 per barrel. This, in turn, has created a lively demand for plate and tank iron for oil tanks, which kinds alone present very special activity. There are considerable inquiries for rails, unfortunately coupled with the old and worn out bond coal rails, which will no longer buy iron or steel rails. A general feeling of encouragement is, however, noticeable, and it is probable that another fortnight will show a fair, if not active, demand for iron, both raw and finished. In the line of improved manufactures and processes, several promising items must await my next.

**Slate Paint for Roofing—Gline's Patent.**—At length an invention has been made that is much needed for warm climates, and particularly Cuba and the other sugar countries, where so many fires constantly occur on the estates, caused by inflammable roofing covered with some composition of pitch. The slate paint being cheap, it is within reach of the means of the people at large, thus commending itself both to the husbandman and to the planter that may wish to protect their roofs from damage by water and fire. The principal ingredient of the paint is slate in solution, which, within a month from the time it is put on, crystallizes and hardens in the open air, thus furnishing a sort of iron-clad coat, which has penetrated into the interstices of the roof everywhere. We call attention to the card of the paint, which is equally adapted to cold and warm climates.—*El Cronista.*

## Foreign Market Reports.

## GERMANY.

(Borndorff.)  
HAMBURG, Aug. 15, 1873.—Metals have hardly led to any business at all during the week. Lead neglected and easier; German, 25 to 26 marks. Copper is bought for local consumption only in moderate quantities. Northern sorts, 94 to 105. In Tin a trifling upward movement. Banca at 130. English at 140 to 145. Rods at 142½ to 145. Spelter paralyzed at nominally 36.

ESSEN, Aug. 31, 1873.—Coal and Metallurgical Matters.—Notwithstanding the utter stagnation in metallurgical affairs, and the absence of a couple of months past of orders in the iron line, Coal is scarcer here than at any previous time, especially Bituminous. So-called "Coal futures" have been done between 21 and 26 francs the 1000 kilos, for 1874, which is from 3 to 4 francs higher than the winter time 1873. This anxiety of securing Coal months ahead is attributable to the fact that our work-shops are loaded down with old orders to be filled, and to the expectation of fresh ones shortly. It is due, finally, to the great development of Iron industry in general in this vicinity, of which a momentary dullness is but a passing phase. Altogether differently situated is Coke, which ranged between 60 and 75 francs, and can now with ease be procured at 48 to 50 francs the 1000 kilos. This is traceable to the paralysis observable in Cast Iron production and the curtailing of work at the furnaces. We are thus pretty much in the same position as people are in Belgium. Ruhr country Coal production in 1872 has been 14,299,960 tons against 12,532,236 in 1871, being an excess of 15% per cent. In 1872, despite a six week's strike. Early in 1872 there were 14,802 men employed in the Coal mines, and toward the close of the year, 68,332. Coal prospecting is going on uninterrupted, and 12 new mines are in operation expected to produce from 7000 to 10,000 hectolitres daily. This holds out some promise, but the number of miners does not increase, and the amount of Coal brought to light is thereby decreased steadily in precise proportion to the raised wages they are gradually receiving; the more you pay them, the less they produce.

## BELGIUM.

(Monteur des Interests Materiels.)

BRUSSELS, August 16, 1873.—Iron matters are in about the same position as heretofore, there still being a dearth of orders. An attempt has been made to further lower the price of Wrought Iron and Sheet, but we cannot see that this will help us much. A lowering of value of a special nature does not influence the general range, and the whole policy of stimulating business by tinkering of the kind leads to nothing. The moment seems an inopportune one to show the English committee, that come to inspect Belgian metallurgical industry, our works; but we need not labor under a false bashfulness, considering that in England they are in about as poor a plight as we are in Belgium. Let them, on the contrary, convince themselves that the fictitious scarcity of Coal produces the identical effects in England and on the Continent. The standing of our visitors is such that we ought to look upon it as tribute of respect that they come over to personally investigate the anomalous state of affairs among us. Besides, they do not overlook that whenever great questions of international interest are to be solved in England, Belgian engineers are numerically most represented at their meetings, as compared to others from the Continent, and they evidently are anxious to study on the spot the intelligent progress which is steadily going on in Belgium in iron matters in general and Machinery in particular. Coal.—Nothing strikingly new has occurred; English and German Coal steadily arrives, and although Belgian producers do not seem in the least disconcerted on that account, consumers nevertheless are hopeful of a speedy general break in values in this country. It is leaking out, beside, that in many instances where large bargains are made the Belgian Coal producer has begun to make concessions. At Mons, Coal has commenced to accumulate. The producers try to explain this greater abundance by an enumeration of local causes, but we shall see quite a respectable glut at that particular spot the moment rising rivers stimulate the forwarding of Coal. Besides, Belgian Coal producers ought to bear in mind that both Glass and Iron manufactures are stagnant among us. Coke has already felt the effect of it.

## FRANCE.

(Monteur des Interests Materiels.)

PARIS, Aug. 17, 1873.—Iron.—We have to record the same weakness in prices and the same lack of orders. The high price of Coal causes a big iron to decline a great deal faster than Wrought Iron at this juncture, and while we have this spectacle to confront, we certainly cannot expect an improvement in the latter and its manufactures. Steel forms an exception, due to the circumstance that Steel (we wish to allude more specially to Bessemer and Martin) is made in our large works with a full supply on hand, and that the present crisis leaves them comparatively unaffected. Some of these monster establishments have, indeed, experienced no diminution in the work on hand, present or prospective, with no chance of a decline in values looming up before them. But it would be wrong to draw any conclusions of a general nature from special cases of the kind. We expect the delegates of French forces to attend the meeting at Liege (Belgium) to-morrow. General Melles-Were are glad to be able to announce a better feeling in metallurgical circles, in general due to the maintenance of the discount at a reduced figure on the one hand, favorable to speculators, and rather improved crop prospects. Nevertheless, nobody is sanguine enough to pin too much faith to this slightly more encouraging aspect. No great increase of activity is likely to result forthwith. On the contrary, many of our shrewd metal men seem of opinion that metals will have to give way still further ere a lasting and sound revival can take place in metal matters. This relates more particularly to Copper, of which large quantities cannot be made to move, except at certain important concessions. We hear from England that the movement of Copper during the first seven months has been: Imports—Ore, 31,812 tons; Regulus, 17,738 tons; pure Copper, 20,159 tons; Pyrites of Ore of Iron, Copper and sulphur combined, 32,806 tons. Raw and Wrought Copper export of England during the seven months, 13,066 tons. Child Copper here and at Havre still apathetic at 212½ to 217½ francs for Bars, and 227½ to 230 for Ingots. In Germany the lower discount has not improved Copper, which is quiet, with a gradually increasing stock. Berlin remains at 31½ thalers the 50 kilos. Tin has been more active all over the Continent, but prices rise with difficulty. Paris quiet and unchanged at 90 for Banca here and at Havre. Berlin at 45½, Stettin, ditto, 49. Lead is quiet, but firm. Paris with very little doing. French Lead, 59; Spanish and other kinds, 57. Firm at Berlin at 8½; Stettin, 7 1/2 to 8½. Spelter—More intensely dull in the leading markets. Paris is utterly stagnant at 63½ for Silesian. Absolutely nothing doing at either Berlin or Breslau.

## (Le Commerce.)

PARIS, Aug. 23, 1873.—Coal.—Although our Coal companies nominally maintain previous figures, it is an ascertained fact that at private sale they are selling below them. By nominally upholding extreme figures they evidently wish to wield a sort of terrorism and frighten the small fry into submitting to old exorbitant rates. Fortunately, the future has passed by when this management of theirs can be productive of any good to themselves. The people of France are not wholly dependent upon French Coal companies, but can search for a supply in England, which they do. Newcastle seems to have caught the spirit which animates the Coal consumers of both France and Belgium, and its travelers are now to be met with among us, furnished with all powers to make such bargains as they may deem fit. Indeed, Newcastle and Cardiff are both making a great effort to bring back within the folds of their custom the Franco-Belgian flock that had been scattered away from them by the great rise. This movement in France to do away with domestic Coal altogether, if possible, is a gigantic one, and into all our ports, Channel, Atlantic and Mediterranean, English supplies are steadily being poured. The famous Franco-Belgian coalition of Coal companies at length begins to perceive that their plan to keep Coal at famine rates is destined to be a miserable failure, the more so as the winter season will soon be at hand and hamper transportation. France and Belgium will commence the winter season with an ample stock of English Coal, and as both countries export a little by sea for some time past, no extraneous demand can or will come to the relief of our Coal markets. Coal will decline, and through the instrumentality of cheaper Coal there will be a general revival in Iron industry.

## HOLLAND.

(Koch &amp; Viterboom.)

ROTTERDAM, Aug. 19, 1873.—Tin is inanimate; but few sales have transpired on the spot at 79 guilders for Banca and at 78 for the same, deliverable from the second fall auction.

## EAST INDIES.

(J. Peet &amp; Co.)

BATAVIA (Java), July 16, 1873.—There is not a single vessel loading for any port in the United States, and some lots of produce bought for that country are now in course of shipment to Holland instead. Tin.—Billiton: last auction's average for 9000 piculs was 57 1/2 guilders per picul. The next auction will comprise 57 1/2 guilders per picul, and take place on the 14th proximo. Coal.—Considerable arrivals, but to consumers, and 100 to 300 tons English are not to be bought under 40 to 45 guilders per ton. Australian we value at 38 guilders per ton. Freight—A rather large number of chartered vessels has arrived, more, indeed, than our market could take off readily. To the Channel we quote £4; for the United States, Persia, or Australia there is as yet no demand whatever. Exchange, 6 months, London, 11 1/2 to 11 3/4 guilders the £.

(Aitken, Spence &amp; Co.)

COLOMBO, (Ceylon), July 26, 1873.—Plumbago.—Inquiry for the United States has almost entirely died away, and rates are somewhat easy. We hear of some purchases during the past fortnight for London account at current rates. The Loch Awe left Cally on the 15th inst. for New York, having a total of 220 tons Plumbago on board, besides other cargo. The Chanticleer left Trincomalee for New York on the 5th inst., after having undergone repairs. She is reported to have left 60 tons Plumbago behind. The Magdala is getting on fairly with her loading, and will probably leave early next month. We hear of no further vessels being fixed for the United States. We quote Lump 52½ per ton, free on board, with commission; exchange par. Freight to New York, 15 per ton. Chip, 24½; Dust, 136/6. Total shipments of Plumbago from Ceylon to the United States from Oct. 1, 1872, to date, 92,538 cwts., against 42,700 last year. Export to England this season, 49,660 cwts.; to the Continent, 783; and to Australia, 269. Exchange—Further favoring drawers; Credits, 3½ to 3½ per cent. premium.

(Ernsthausen &amp; Oesterley.)

CALCUTTA, August 19, 1873.—Metals.—English Tin Copper, 34 rupees; real Silesian Spelter, 10-4, and Yellow Metal, 32-8.

(Bousfield &amp; Co.)

SINGAPORE, July 12, 1873.—Tin.—In the early part of the fortnight Tin was in moderate demand for the United States at \$34½ to \$34½. London advice being very unfavorable, there seemed a probability of lower rates, but the demand for China having recommenced, prices have taken an upward movement, and during the last two days about 400 piculs have been purchased for that quarter at \$34½ to \$35. Market cleared. Iron continues firm, but the few sales reported are trifling. Good Flat Bar has been sold at \$4½ for picked sizes. Nail Rods are worth \$4½. Hoops is very scarce, and nominal in value at \$6½. Of Swedish the market is cleared, and high rates are asked for first arrivals. Yellow Metal has been very quiet at \$26 to \$27, only one small sale at the higher quotation reported. Copper Sheathing is in some request, but stocks are almost cleared. Last sales were at \$31½. Zinc Sheathing is still neglected, and price nominal at \$9. Roll Zinc required for at \$24½ to \$25. Brass Wire, owing to several holders being anxious to reduce stock, is slightly declined, and sales have been effected at \$20½, No. 1-6, and \$27½ to \$28 No. 1-20. Pig Lead is quiet; holders have been asking \$7 for L. B., with a small sale at this. Stock light. Sheet Lead, slow at \$12½ to \$13½. Steel firm at \$5½. Coal, inactive at \$12½ to \$13½, English.

## AFRICA.

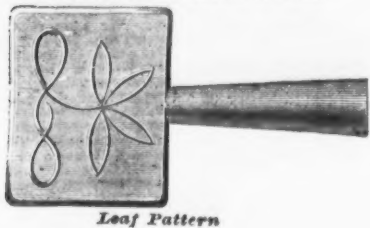
(Alexander Duff &amp; Co.)

MAURITIUS, July 24, 1873.—Galvanized Iron steady at \$9 to \$10 the 100 pounds. Tin Plates, \$12½ to \$13 per case. L. C. Coal is nominal, none in the market; English at \$10 to \$11 per ton. Patent Fuel, \$14. Freight.—We have a very limited amount of tonnage in harbor, by far inadequate to meet our wants. When the crops begin to move rates of freight will rule high. Exchange.—Bank rate 90 days, London, 4 per cent. premium.



# H. D. SMITH & CO., PLANTSVILLE, CONN.

Patent Embossed Steps.



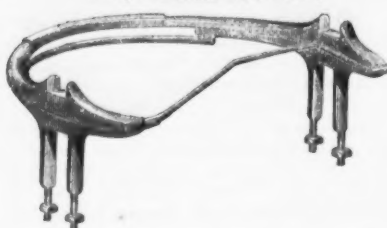
Leaf Pattern.

King Bolt Yokes.

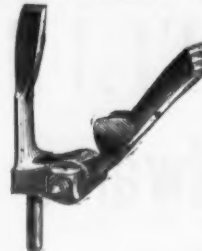


Established 1850.

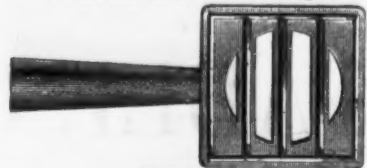
No. 6 Fifth Wheels.



1871 Pattern Shaft Couplings.



Patent Cross Bar Steps.

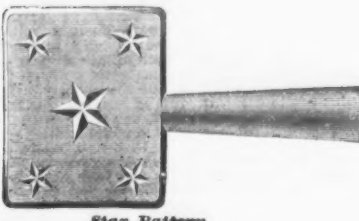
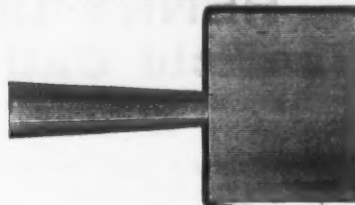


Upper View.



Lower View.

Solid Plain Pattern Steps.



Star Pattern.

Smith's Improved Philadelphia Pattern Slat Irons.



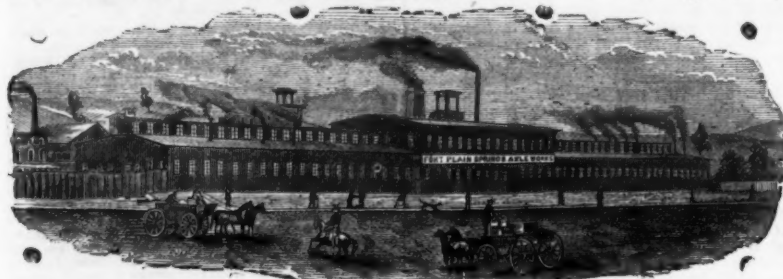
MANUFACTURERS OF A LARGE VARIETY OF FIRST-CLASS

## FORGED CARRIAGE IRONS.

Send for Price List.

### FORT PLAIN SPRING & AXLE WORKS, CLARK, SMITH & CO.,

Green Jacket Axles. FORT PLAIN, N. Y. Fine Carriage Springs.



MANUFACTURERS OF

English and Swedes Steel Springs, and Iron and Steel Axles.

Execute orders promptly for

Black, Bright, Tempered and Oil Tempered Springs,

of any Pattern or Style. Also for AXLES of any description, from a COMMON LOOSE

COLLAR to the FINEST OF STEEL.

Our facilities for manufacturing are very extensive, and with our recent additions of new and improved machinery, we defy competition.

Send for Price List and Descriptive Circular.

### CARRIAGE BOLTS.

Buy the Best.



Clark's Patent Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not turn in its place.

MANUFACTURED BY

CLARK BROS. &amp; CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &amp;c

Send for New Illustrated Price List, just completed.

### R. M. GREEN,

100 Chambers Street, NEW YORK.

Hardware Manufacturers' Agent.

REPRESENT:

BACHELLER MFG. CO., Cast Steel Forks, Rakes, &c.  
VERMONT SNATH CO., Snaths.  
H. C. COLE, Ox Bows.  
NORTH CAROLINA HANDLE CO., Axe and Pick Handles.  
EXCELSIOR MFG. CO., Carriage Rims, Hubs and Spokes, Wood Hay Rakes.  
VERMONT MFG. CO., Hay, Manure and Shovel Handles. All kinds of Ash, and Hickory Timber Sawed and Turned to order.



### Breast Hold-Back Co.

210 &amp; 212 First Street, TROY, N. Y.

Sole Manufacturers of

### COVERT'S PATENT METALLIC BREAST HOLD-BACK.

Made of the best Malleable Iron. The Snap is a new invention, and superior to any yet introduced. The spring is encased in the hollow shank of the snap, preventing dirt from getting to it, and without danger of being broken or disarranged. This article has been in use five years by Farmers, Teamsters, Stage Proprietors and Horse Railroad Superintendents.

It gives good satisfaction. It is cheaper and more durable than anything of the kind in use. For sale by the Hardware Trade.  
Send for Circular and Price List.

**Iron & Brass Wood Screws.**  
Full assortment constantly on hand.  
**ALFRED FIELD & CO.,**  
Importers,  
47 John, and 5 Dutch Streets, N. Y.

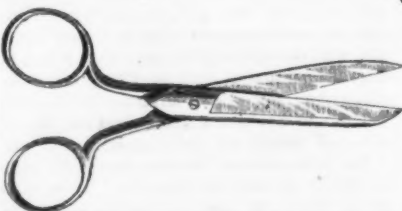
## UNITED STATES STEEL SHEAR COMPANY,

WEST MERIDEN, CONN.,

The Only Manufacturers of

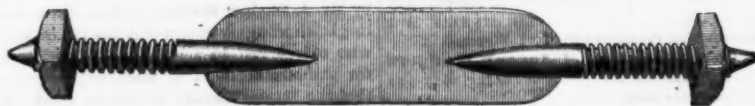
### SOLID STEEL SHEARS

in the United States.



### Phila. Carriage Bolt Works,

Established 1855.



Hand-made Axle Clip.

### T. SKELLY

MANUFACTURER OF FINEST QUALITY OF

NORWAY IRON

### CARRIAGE & TIRE BOLTS,

Hand Made Axle Clips,

Skelly's Improved T-Head &amp; Whiffletree Bolts,

Cone, Cheese, Square and Diamond Head

### BOLTS,

And all the Different Varieties Used by Makers of

Fine Carriages,

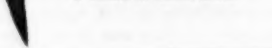
TWENTY-FOURTH ST., BELOW CALLOWHILL,  
PHILADELPHIA, PA.

Pointed Tire Bolt.



EVERY BOLT AND NUT WARRANTED TRUE TO SIZE AND FIT

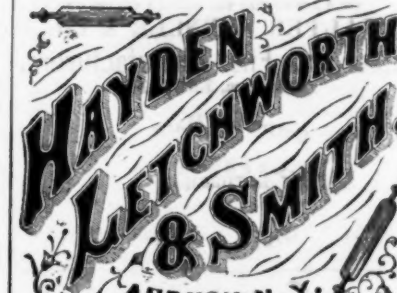
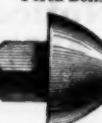
Skelly's New Style Improved T Head or Shaft Bolt.



Cone Head Bolt.



Elliptic Head Perch Bolt.



**HAYDEN  
LEITCHWORTH  
& SMITH.**  
AUBURN, N. Y.  
MANUFACTURERS OF  
FORGED NORWAY IRON  
Carriage Hardware

HAMES and  
Saddlery Hardware.

### CARRIAGE MATERIALS.

**AXLES**  
Blacksmiths' Supplies,  
Bolts, Woodwork,  
TRIMMINGS, &c.  
Iron & Steel.  
HORSE SHOES  
**SPRINGS**

Manufactured and sold by  
**GUY C. HOTCHKISS & FIELD**  
85 First Street, Brooklyn, E. D.  
And 527 Hudson St., New York.

### H. M. WENTWORTH & CO.,

Manufacturers of  
Carriage Axles & Springs,  
**BEST SWEDEN STEEL,**  
Sword Tempered, and  
Common Patent Tempered SPRINGS  
Of every description, made to order.  
Dam No. 3, Water St., Gardiner Me.  
Send for Price List.  
H. M. Wentworth. F. A. Plalsted.  
David Wentworth.

## THE Philadelphia Star Bolt Works.

Carriage and Tire Bolts,

Axle Clips,

Blank Bolts, &amp;c.

Square Head Bolts,

Wood Screws.

Flow Bolts, &amp;c.

### TOWNSEND, WILSON & HUBBARD,

2301 Cherry Street, PHILADELPHIA,

MANUFACTURERS OF THE CELEBRATED

"STAR" Brand of Axle Clips.





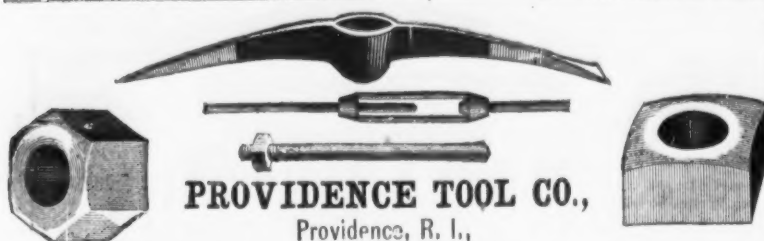
# The Iron Age Directory

## and Index to Advertisements.

Agricultural Steels and Irons, etc., Makers of.	
Nellis, A. J. & Co., Pittsburgh, Pa.	21
Anvils, Manufacturers of.	
Fisher & Norris, Trenton, N. J.	21
Augers, Bits, etc., Manufacturers of.	
Shattuck W. F. & Co., 113 Chambers, N. Y.	8
Axes, Springs, etc., Manufacturers of.	
Clark, Smith & Co., Fort Plain, N. Y.	12
Hutchings Guy C. & Field, Brooklyn, E. D.	12
Wentworth H. M. & Co., Gardiner, Me.	12
Band Saw Machines, Makers of.	
Richards, London & Kelly, Phila.	1
Band Saws and Tools for Brazing &c., Importers of.	
Guenther George, 30 W. 4th, N. Y.	10
Bellevue, Manufacturers of.	
Churchard, Joseph, Buffalo, N. Y.	3
Newcomb Bros. Sons, 596 Water, N. Y.	25
Belting, Leather, Makers of.	
Alexander Bros., 412 N. 3d, Phila.	15
Belt Patches, Manufacturers of.	
Kellogg E. C. & Co., Hartford, Conn.	15
Bird Cages, Makers of.	
Lindeman O. & Co., 254 Pearl, N. Y.	3
Maxheimer John, 249 Pearl, N. Y.	5
Bit Braces, Manufacturers of.	
Muller's Falls Mfg. Co., 78 Beekman, N. Y.	21
Boilers—Steam.	
Verner Thos. 30th and Chestnut, Phila.	31
Boiler Components, Makers of.	
Mayer L. 59 Mercer, N. Y.	31
Bolt Heading Machines, Manufacturers of.	
Chapin Machine Co., New Hartford, Conn.	24
Phim, Burdett & Harman, Buffalo, N. Y.	32
Brass, Manufacturers of.	
Ansonia Brass and Copper Co., 19 Cliff, N. Y.	2
Benedict & Burnham Mfg. Co., Waterbury, Conn.	2
Brooklyn Brass and Copper Co., 100 John, N. Y.	2
Coe Brass Mfg. Co., Wolcottville, Conn.	2
Pine & Atwood Mfg. Co., 80 Chambers, N. Y.	2
Sevill Mfg. Co., 78 Beekman, N. Y.	2
Waterbury Brass Co., 32 Beekman, N. Y.	2
Brass Hold-Backs.	
Breast Hold-Back Co., Troy, N. Y.	12
Brick Presses, Makers of.	
Carnell Geo., 1818 Chambers, N. Y.	20
Carnell F. L. & D. R., 1844 Germantown Ave., Phila.	20
Bridge Builders.	
Moseley Iron Bridge and Roof Co., 5 Dey, N. Y.	4
Bronze Hardware.	
Haley James, 18 Beekman, N. Y.	9
Butcher and Sash Knives, Manufacturers of.	
Wilson John, Sheffield, England.	23
Butts and Hinges, Makers of.	
American Butt Co., Providence, R. I.	26
Edna Nut Co., 183 Mulberry, N. Y.	27
Crooke & Co., 183 Mulberry, N. Y.	27
Ohio Butt Co., 97 Chambers, N. Y.	27
Roy & Co., West Troy, N. Y.	27
Stanley Tools, 58 Beekman, N. Y.	27
Union Mfg. Co., 58 Chambers, N. Y.	27
Cabinet Hardware, Manufacturers of.	
Lander, Perry & Co., 226 Broadway, N. Y.	11
Carriage Bolts, Makers of.	
Skelly T., 34th below Calverhill, Phila.	12
Townsend, William & Hildard, Phila.	12
Carriage Hardware, Manufacturers of.	
Harden, Letworth & Smith, Auburn, N. Y.	12
Smith H. D. & Co., Plantville, Ct.	12
Car Wheels, etc., Manufacturers of.	
Jackson & Woodin, Middletown, Pa.	4
Taylor Iron Works, High Bridge, N. J.	4
Cash Drawer—Alarm, Manufacturers of.	
Tucker & Dorney, Indianapolis, Ind.	15
Chains, Makers of.	
Call, Gordon & Co., 1545 Richmond, Phila.	4
Kendrick & Rankie, Trenton, N. J.	4
Wyatt Thos., 71 Eddy, Providence, R. I.	4
Chisels, Manufacturers of.	
Brook Bros., Millbury, Mass.	14
Clothes Wringers, Manufacturers of.	
Providence Tool Co., 11 Warren, N. Y.	14
Coal, Dealers in.	
Boyer L. S. & Co., 70 Broadway, N. Y.	6
Coal, Makers of.	
Farde A. & Co., 111 Broadway, N. Y.	6
Coal and Iron, Dealers in.	
Persons B. W., 30 Weybosset, Providence, R. I.	6
Coal Hods, Manufacturers of.	
Eastbrook, Wm., Phila.	23
Ohio Coal Rod Co., Cincinnati, O.	23
Smith Burns & Co., 45 Cliff, N. Y.	20
Coffee and Spice Mills.	
Lane Brothers, Millbrook, N. Y.	20
Enterprise Mfg. Co., Philadelphia, Pa.	20
Coffee Trimmings, Makers of.	
Wayne Hardware Co., Cincinnati, O.	14
Commission Merchants, English.	
Loddard Samuel A. & Co., Birmingham, Eng.	6
Compasses and Dividers, Manufacturers of.	
Bemis & Call Hardw. & Tool Co., Springfield, Mass.	15
Cooper's Tools, etc., Dealers in.	
Little Chas. E., 50 Fulton, N. Y.	7
Cordage, Rope, etc.	
Allen H. & Sons, 136 South, N. Y.	3
Corn Huskers, Makers of.	
Parks Brothers, Princeton, Ill.	3
Corrugated Sheet Pipe Elbows, Makers of.	
Sellow Elbow Co., N. Y. and Chicago.	4
Crucibles, Manufacturers of.	
Newkumet Adam, 157 N. Front, Phila.	20
Rose, Stow & Co., Springfield, Mass.	20
Taylor, Stow & Co., Phila.	20
Curry Combs, Manufacturers of.	
Kellogg W. P. & Co., Troy, N. Y.	30
Cutlery, Importers of.	
Baker Hardware, 101 Duane, N. Y.	22
Dickinson Henry, 65 and 66 Duane, N. Y.	11
Fisher Jos. S., 411 Commerce, Phila.	11
King H. & J., 45 Chambers, N. Y.	11
Peace Chas. Jr., 82 Chambers, N. Y.	11
Ward Asahel, 101 Duane, N. Y.	11
Wilson Markworth, 111 Duane, N. Y.	11
Smith & Hall, 50 and 60 Reade, N. Y.	11
Taylor Thomas & Chambers, N. Y.	11
Cutlery, Manufacturers of.	
American Knife Co., Thomaston, Conn.	11
Barkinslaw Aaron, Peppercorn, Mass.	11
Lander, Perry & Co., 226 Broadway, N. Y.	11
Miller Bros. Cutlery Co., W. Meriden, Conn.	11
New York Knife Co., Walden, N. Y.	11
Plant Brothers, Birmingham, England.	11
U. S. Steel Shear Co., W. Meriden, Conn.	11
Differential Pulley Blocks, Makers of.	
Van Wart & McCoy, 43 Chambers, N. Y.	31
Dog Collars.	
Mercer W. T. & J. 42 Duane, N. Y.	15
Dress and Gait Sewing.	
Palmer & Gray, 25 Elm, Cincinnati, O.	22
Van Wagner & Williams, 21 Park Row	15
Dredging, and Makers of Dredging Machines.	
Am. Dredging Co., 214 S. Delaware ave., Phila.	31
Drill Chucks, Manufacturers of.	
Cushman A. F., Hartford, Conn.	15
Hubbard & Curtis Mfg. Co., 82 Chambers, N. Y.	15
Drilling Machines, Makers of.	
Miller Falls Co., 78 Beekman, N. Y.	21
Thorne & DeHaven, Philadelphia.	21
Dumpling Truck for Bar Iron, Lumber, &c.	
Amstutz J. & Co., 105 Fulton, N. Y.	6
Edge Tools, Makers of.	
Bradley G. W., 31 Chambers, N. Y.	11
Elevators, Makers of.	
Otis Bros. & Co., 348 Broadway, N. Y.	9
Emery Wheels, Makers of.	
The Union Stone Co., 16 Exchange, Boston.	9
Engineers, Machinery, etc.	
Henshall James, 106 Beach, Phila.	31
James Moore, Cor. 10th and Buttonwood, Phila.	31
Tave & Hartman, 120 N. Front, Phila.	31
Engines, Steam, Makers of.	
Fishkill Landing Mch. Co., Fishkill-on-the-Hudson, N. Y.	30
New York Steam Engine Co., 30 Broadway, N. Y.	30
Paulding, Kemble & Co., 30 Broadway, N. Y.	30
Whitehill, Smith & Co., Newburgh, N. Y.	30
Wright J. W., 123 Spruce, Phila.	30
Yale Iron Works, New Haven, Conn.	30
Engines, Wood.	
Patterson Jas. & Sons, Spruce, N. Y.	6
Roberts Wm. & Co., Springfield, Mass.	6
Tuttle, D. H., 5 Beekman, N. Y.	6
Eyeglasses.	
Union Eyeglet Co., Providence, R. I.	3
Fancets, Self-Measuring.	
Enterprise Mfg. Co., of Pa., Phila. and N. Y.	26
Files, Importers of.	
Carr J. & Riley, 30 John, N. Y.	28
Dickinson Henry, 65 and 66 Duane, N. Y.	11
Fisher Joseph S., 411 Commerce, Phila.	11
Fraser Peter A. & Co., 30 Fulton, N. Y.	3
Homer Foot & Co., Springfield, Mass.	3
Moss F. W., 30 John, N. Y.	3
Sanderson Bros. & Co., 16 Cliff, N. Y.	28
Seeger & Jackson, 43 Chambers, N. Y.	28
Files, Manufacturers of.	
Harnett G. & H., 41 and 43 Richmond, Phila.	8
M. J. Harnett & Sons, 174 N. 4th, Phila.	8
Nicholson F. C., Providence, R. I.	8
Wheeler, Clemson & Co., Middletown, N. Y.	8
Fire Arms, Manufacturers of.	
Robinson M. W., 70 Chambers, N. Y.	13
Schoverling & Daly, 84 Chambers, N. Y.	13
Spies Kissan & Co., 279 Broadway	13
Fire Bricks, Makers of.	
Hall A. & Sons, Perth Amboy, N. J.	20
Kreischer J. & Son, 38 Goerck, N. Y.	20
Newkumet Philip, 234 and Vine, Phila.	20
Palmer, Newton & Co., Albany, N. Y.	20
Watson John R., Perth Amboy, N. J.	20
Flint and Emery Paper and Cloth.	
Cordell & Sons, 113 Chambers, N. Y.	15
Fluting Machines, Makers of.	
Lower & Tucker, Newark, N. J.	30
Gage Cocks and Damper Regulators.	
Murphy & Kelzer, Baltimore, Md.	31
Galvanized Iron.	
Lefferts Mather, 94 Beekman, N. Y.	4
Glass, Importers of.	
Downing A. C. & Co., 57 Beekman, N. Y.	24
Grindstones.	
McNemott J. & Co., Cleveland, O.	9
Wood Walter L., 235 and 3rd Front, N. Y.	9
Gunpowder, Makers of.	
Kneeland F. L. (Dupont), 50 Wall, N. Y.	28
Lafin & Lang Powder Co., 21 Park Row, N. Y.	28
Hammers, etc., Manufacturers of.	
Emmet Hammer Co., Brooklyn, E. D., N. Y.	21
Hammond C. & Son, 13 N. 5th, Phila.	21
Nelson Tool Works, 157 E. 3rd, N. Y.	15
Hardware, Brass and Galvanized.	
Tiebout W. & J., 290 Pearl, N. Y.	2
Hardware, Commission Merchants.	
Fernald & Sies, 130 Chambers, N. Y.	8
Green R. M., 109 Chambers, N. Y.	8
Graham & Haines, 38 Chambers, N. Y.	26
Raley J. E., 70 Reade, N. Y.	16
Walbridge Geo. B., 35 Chambers, N. Y.	16
Hardware Dealers.	
Imney Thos. L. & Co., Vicksburg, Miss.	3
Lloyd, Supplies & Walton, 625 Market, Phila.	3
Louderback, Gilbert & Co., 53 Chambers, N. Y.	15
Shepard Sidney & Co., Buffalo, N. Y.	31
Turner, Seymour & Judd, 61 Duane, N. Y.	8
Hardware Importers.	
Beam & Murray, 31 Cliff, N. Y.	32
Baker Hermann & Co., 111 Duane, N. Y.	32
Field Alfred & Co., 47 John, N. Y.	32
Hilger & Sons, 57 Chambers, N. Y.	32
Hunt & Co., 113 Chambers, N. Y.	32
E. Frith, 16 Cliff, N. Y.	32
Louderback, Gilbert & Co., 53 Chambers, N. Y.	15
Van Wart & McCoy, 43 Chambers, N. Y.	11
Hardware Manufacturers.	
Biddle Mfg. Co., 78 Chambers, N. Y.	22
Burnie Horses, 37 Chambers, N. Y.	22
Enterprise Mfg. Co., Phila.	22
Hart, Blyden & Mead Mfg. Co., 249 Pearl, N. Y.	26
Kellogg Wm. F. & Co., Troy, N. Y.	26
Lane, Gale & Co., Troy, N. Y.	26
Louderback, Gilbert & Co., 53 Chambers, N. Y.	15
Mary F. L. & Marshall, 45 Chambers, N. Y.	26
Middletown Tool Co., 11 Warren, N. Y.	26
Muller's Falls Mfg. Co., 78 Beekman, N. Y.	21
Pratt & Co., Buffalo, N. Y.	26
Providence Tool Co., 11 Warren, N. Y.	14
Russell & Erwin Mfg. Co., 45 Chambers, N. Y.	22
Schwartz Mfg. Co., 51 Reade, N. Y.	10
Shattuck W. F. & Co., 113 Chambers, N. Y.	10
Stanley Tools, 58 Beekman, N. Y.	27
Turner, Seymour & Judd, 61 Duane, N. Y.	8
Union Mfg. Co., 53 Chambers, N. Y.	27
William White & Churchill, 73 Warren, N. Y.	23
Wilson Mfg. Co., 53 Chambers, N. Y.	23
Hardware Specialties.	
Biddle Mfg. Co., 78 Chambers, N. Y.	24
Haase John A., rear 115 Vanhorn, Phila.	10
Louderback, Gilbert & Co., 53 Chambers, N. Y.	15
Semple, Higgs & Co., St. Louis.	15
Helve Hammers, Makers of.	
Bradley Mfg. Co., Syracuse, N. Y.	23
Holding Engine, Makers of.	
Otis Bros. & Co., 348 Broadway, N. Y.	9
Horse Hay Forks and Fixtures, Makers of.	
Nellis A. J. & Co., Pittsburgh, Pa.	32
Horse Nails, Makers of.	
Useful Home Nail Co., 38 Chambers, N. Y.	23
Brundage & Co., Middletown, N. Y.	23
Globe Nail Co., Boston, Mass.	23
Pratt & Co., Buffalo, N. Y.	23
Putnam S. S. & Co., Neponset, Mass.	16
Horse Shoes, Makers of.	
Borden Iron Works, Troy, N. Y.	4
Hubs and Spokes, Mfrs. of.	
Gleason J., 2nd and Diamond, Phila.	12
Hydraulic Jacks.	
Dudgeon Richard, 24 Columbia, N. Y.	31
Ice Cream Freezers, Makers of.	
Torry E. S. & J., 166 Fulton, N. Y.	20
Insurance, Boiler.	
Hartford Steam Boiler and Inspection Co.	20
Iron Brokers.	
Boynston Geo. A., 30 Wall, N. Y.	6
Hasard & Jones, 212 Pearl, N. Y.	6
Pettit Wm. H., 72 Wall, N. Y.	6
Iron, Corrugated, Manufacturers of.	
Corrugated Metal Co., East Berlin, Conn.	4
Iron, Charred, Warm or Cold Blast.	
Quincy John W. & Co., 15 William, N. Y.	4
Iron Commission Merchants.	
Blackiston & Cox, 333 Walnut, Phila.	6
Hand Jas. C. & Co., 614 and 616 Market, Phila.	6
Hopewell W. Graham, 419 Walnut, Phila.	6
Malia Bros., 228 Dock, Phila.	6
Iron Pig, Importers of.	
William James & Co., 59 Wall, N. Y.	4
Iron Dealers.	
Abel Brothers, 190 South, N. Y.	4
Bonnell, Botsford & Co., Youngstown, O.	4
Borden & Lovell, 30 and 31 West, N. Y.	4
Buchanan Geo., 19 Bitchen Lane, London, E. C.	4
Coddington T. R. & Co., 25 Cliff, N. Y.	4
Conklin & Huerstel, 92 Market, N. Y.	4
Fuller, Lord & Co., 139 Greenwich, N. Y.	4
Fuller, Dana & Fitz, 110 North, Boston.	4
Gardner Wm., 153 Grand, N. Y.	4
Hall, Kimbark & Co., Chicago.	4
Harrison & Gilson, 508 to 562 Water, N. Y.	4
Hart E. R. & G., 226 Walnut, Phila.	4
Hickson & Chase, 206 and 208 Franklin, N. Y.	4
Judson B. F., 45 and 49 Water, N. Y.	4
Watthens Chas. W., 133 Walnut, Phila.	4
Packard, Goff & Co., Youngstown, O.	4
Pettee & Mann, 228 and 229 South, N. Y.	4
Pienzo & Co., 24 Broadway, N. Y.	4
Quincy John W. & Co., 15 William, N. Y.	4
Richards D. W. & Co., 21 and 23	4
Smith Gam' & Co., 342 Pearl, N. Y.	4
Warner A. B. & Sons, 28 and 29 West, N. Y.	4
William James & Co., 59 Wall, N. Y.	4
Whitney Alfred B., 58 Hudson, N. Y.	4
Iron, Manufacturers of.	
Lushong & Co., 31 Beekman, N. Y.	22
Williamson Iron Works, Middletown, Conn.	22
Burden Iron Works, Troy, N. Y.	22
John Wm. & Co., 17 Battery, N. Y.	22
Everson, Graft & Macrum, Pittsburgh, Pa.	22
Balton S. & Co., 112 Water, N. Y.	22
Jones & Laughlin, Pittsburgh, Pa.	22
Leonard John, 431 and 433 West, N. Y.	22
Worcester Iron Works, Lyndebury, Vt.	22
Millwaukee Iron Co., Milwaukee, Wis.	22
Niles Iron Co., Niles, O.	22
New Haven Rolling Mill Co., New Haven, Ct.	22
Old Dominion Iron & Nail Works Co., Richmond, Va.	22
Oxford Iron Co., 81 Washington, N. Y.	22
Phonix Iron Co., 403 Walnut, Phila.	22
Rowland Wm. & Harvey, Phila.	22
Iron, Hoop, Manufacturers of.	
Wm. Clark & Co., Pittsburgh, Pa.	4
Iron, Swedish, Importers of.	
Joseph Wm. & Sons, 21 and 23	26
Mittler Nils, 60 William, N. Y.	26
Page Ewd. & Co., Boston, N. Y. and Phila.	4
Lace Leather, Manufacturers of.	
Stoyie Wm. H., 80 Library, Phila.	6
Lampers, Manufacturers of.	
Diets R. E. (Tubular) 54 and 56 Fulton, N. Y.	32
Howard & Morse, 45 Fulton, N. Y.	32
Lead, Manufacturers of.	
Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.	25
Lead and Tin Lined Lead Pipe, etc., Mfrs.	
Colwell Lead Co., 213 Centre, N. Y.	2
Locks, Manufacturers of.	
Bushman Wilson, Broadway and Kosuth, Brooklyn, E. D.	12
Brantford Lock Works, Brantford, Conn.	12
Cornwall Lock Works, Cornwall, N. Y.	12
Romer & Co., Newark, N. J.	12
Sargent, Greenleaf & Cole, 300 Broadway, N. Y.	20
Trenton Lock Co., 48 Wall, N. Y.	20
Yale Lock Mfg. Co., 238 Broadway, N. Y.	16
Machinery, Makers of.	
Billings & Spencer Co., Hartford, Conn.	7
Fishkill Landing Mch. Co., 38 Beekman, N. Y.	30
Gear A. S., 56 to 62 Sudbury, Boston.	30
Mason V. W. & Co., Providence, R. I.	30
Charles Moline Co., 30 Broadway, N. Y.	30
Paulding, Kemble & Co., 30 Broadway, N. Y.	30
Pratt & Whitney Co., Hartford, Conn.	30
Roberts Wright Machine Works, Fitchburg, Mass.	30
Sellers Wm. & Co., 1600 Hamilton, Phila.	30
Watson Andrew, 861 Dickinson, Phila.	30
Whitehill, Smith & Co., Newburgh, N. Y.	30
Machine Screws, Makers of	



No. 11 Warren Street, NEW YORK.

**PROVIDENCE TOOL CO.,**

Providence, R. I.,

Manufacturers of

SQUARE AND HEXAGON COLD AND HOT PRESSED NUTS, PICKS, BOLT ENDS, TURN BUCKLES, CHAIN LINKS, ICE CHAIN, FAST AND LOOSE JOINT HINGES.

Providence

Clothes Wringer.

Reliance

Clothes Wringer



SHIP CHANDLERY

All Descriptions.

Warerooms,

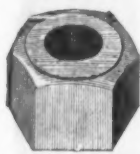
11 Warren, St. N. Y.

H. B. Newhall, Ag't.

No. 11 Warren Street,

**THE READING BOLT AND NUT WORKS.****J. H. Sternbergh,**

READING, PA.,

**H. B. NEWHALL, Agent, New York,**

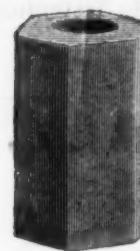
Manufacturing my own stock of Iron from the Pig Metal, and making all sizes of both Square and Hexagon Nuts for 1/4 inch Rods and upward to 2 inch Rods, inclusive. I am able to control quality, and offer a superior article in either large or small quantities, at the lowest possible price.

No. 11 Warren Street,

**RHODE ISLAND NUT CO.,**

Providence, R. I.,

Manufacturers of



Patent Rolled Hexagon Nuts, Rods and Tubing.

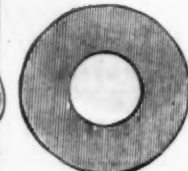
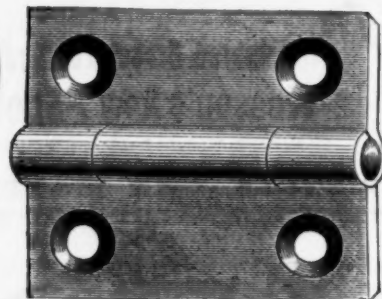
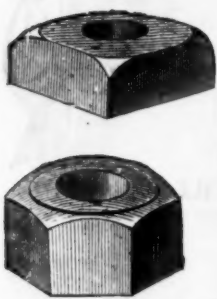
*The Patent Rolled Nut is superior to the best Forged Nut.**In the Patent Rolled Nut the iron is not cut away or punched aside to form the hole, but is rolled over a red by heavy iron rollers.**This process refines the metal. Its fibers are not torn and shocked.**It is cut without injury to the top. The even surface and the general finish of the Nut commend it to machinists.*

Warerooms: No. 11 Warren Street, New York.

H. B. NEWHALL, Agent.

**THE ÆTNA NUT COMPANY,**

Manufacturers of

**Machine Forged & Hot Pressed Nuts,**  
Washers, Bolts, Wrought Narrow Butts, Table and Trunk Hinges,  
Fellow Plates, Axle Clips, Wrought Clip Yokes, Rivets and Burs.We desire to call your attention to our **MACHINE FORGED NUTS**. They are made from extra quality of Iron, combining lightness and strength, and are especially well adapted for Agricultural Machines and Carriage Work.Our **WASHERS** are made on improved machines—making them perfectly flat, smooth and true, and are warranted superior to any in market.

WAREROOMS: No. 97 Chambers &amp; 79 Reade Sts., N. Y.

C. L. CAMPBELL, Agent.

**The National Screw Co.,**

MANUFACTURERS OF

Patent Dovetailed Slot Gimlet-Pointed

**IRON AND BRASS SCREWS.**

COMPLETE ASSORTMENT OF SIZES.

**RUSSELL & ERWIN MFG. CO., Sole Agents**

45 and 47 Chambers Street, New York.

O. Box 3288

Filled promptly.

**WM. H. HASKELL & CO.,**

Pawtucket, R. I.,

Manufacturers of

**Machine and Plow Bolts,**

Coach Screws, Set Screws &amp; Tap Bolts.



Warerooms, No. 11 Warren Street, New York.

H. B. NEWHALL, Agent.

NEW YORK.

No. 11 Warren Street,

**LEWIS, OLIVER & PHILLIPS,**

MANUFACTURERS OF

**Merchant Iron & Heavy Hardware,**

Carriage, Machine, Square Head, Bridge and Skein

**BOLTS,**

Nuts, Washers and Coach Screws, Harrow Teeth, Plow Handle Extension Rods, &amp;c.

**Bolts, Spikes & Wrought Iron Shapes,**

For BRIDGES, DAMS, PIERS, BREAKWATER and other permanent structures, made promptly at a small advance in price of iron.

FOUNDATION BOLTS FOR DAMS, with ends slit by machinery.

Hook and Eye, Screw Hook and Strap, and Strap and T Hinges.

Originators and Patentees of their new line of

**WAGON HARDWARE,**

Comprising Patent Wagon Box Strap Bolts and Wrought Iron Bolster Plates, Large Head Wagon Rivets, Neck Yoke Eyes, King Bolts, Box Rods, Rubber Plates, Axle Bolts, Queen Bolts, Tongue Cap, Sand Band, Single Tree and other Labor Saving odd shapes of Iron. Send for Prices to

**LEWIS, OLIVER & PHILLIPS,**

91 and 92 Water Street and 114 and 116 First Avenue, PITTSBURGH, PA.

Or H. B. NEWHALL, Agent, 11 Warren St., New York.

**COFFIN TRIMMINGS,**

MANUFACTURED BY

**WAYNE HARDWARE CO.,**

124 Main Street CINCINNATI, O.

FRONT VIEW

**LLOYD, SUPPLEE & WALTON,****WHOLESALE****HARDWARE HOUSE,**

AND

**HARDWARE FACTORS.****BATES' MANUFACTURING CO.'S GOODS.**

Bonney's Pat. Hollow Augers &amp; Spoke Trimmers.

Bonney's Patent Double-Edged Spoke Shave.

Bonney's Patent Adjustable Gate Hinge.

Bonney's Patent Sash-Fast and Lamp Bracket.

625 Market Street,

PHILADELPHIA.

BACK VIEW

**BUCK BROTHERS, Millbury, Mass.**

Largest Stock and Best Assortment in the United States of

Shank and Socket Firmer Chisels.

Also, BEST QUALITY SOCKET FRAMING CHISELS

**Metallurgical.****MAYNARD & VAN RENSSLAER,**

CONSULTING

Mining and Metallurgical

**ENGINEERS,**

Experts in Iron and Analytical Chemistry.

24 Cliff Street, NEW YORK.

George W. Maynard. Schuyler Van Rensselaer.

**THOMAS M. DROWN,**

Analytical Chemist

And Consulting Metallurgist,

1123 Girard Street, Philadelphia.

**Henderson's Patent Iron.**

The "Purified Cast Iron" costs but about \$9 per ton more than common coke Pig Iron, and when mixed with one-half wrought iron makes good Cast Steel. The Wrought Iron from common coke Pig Iron makes Cast Steel equal to that made from the best Swedish Bar Iron.

The "Common" Bar Iron from common coke Pig Iron is stronger, softer and tougher than Low-moor Iron.

The "Common" Boiler Plates from ordinary coke Pig Iron are stronger, 50 per cent. softer and 100 per cent. tougher than Low-moor Iron.

For Licenses to make this iron apply to

**JAMES HENDERSON,**

30 Broadway, NEW YORK.

**The Iron-Masters' Laboratory.**

Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags &amp; Coal for Practical Metallurgical Purposes.

No. 339 Walnut Street, Philadelphia.

**J. BLODGET BRITTON.**

This Laboratory was established in 1866, at the instance of a number of practical Iron-masters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for melting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

**CHARGES TO IRON WORKS.**

For determining the per cent. of pure iron in an ordinary Ore..... \$4 00

For the per cent. of Pure Iron, Sulphur and Phosphorus in do..... 12 50

For each additional constituent of usual occurrence..... 1 50

For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances.

For determining the per cent. of Sulphur and Phosphorus in Iron or Steel..... 12 50

For each additional constituent of usual occurrence..... 4 00

For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone..... 10 00

For each additional constituent..... 2 00

For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal..... 12 50

For determining the constituents of a Clay, Sing, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore.

For a written opinion or letter of instruction the charge must necessarily depend upon circumstances.

Printed instructions for obtaining proper average samples for analysis furnished upon application.

**SCHOOL OF MINES,**  
COLUMBIA COLLEGE,

East 49th Street, NEW YORK.

**FACULTY:**

F. A. P. BARNARD, S. T. D., LL. D., President.

T. EGLESTON, JR., A. M., Mineralogy and Metallurgy.

FRANCIS L. VINTON, E. M., Mining Engineer.

C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.

JOHN TORREY, M. D., LL. D., Botany.

CHARLES A. JOY, Ph. D., General Chemistry.

WILLIAM G. PECK, LL. D., Mechanics and Mining Surveying.

JOHN G. VAN AMRIDGE, A. M., Mathematics.

OSBORN N. HOOD, A. M., Physics.

JOHN S. NEWBERRY, M. D., Geology and Paleontology.

The plan of this school embraces a three years' course for the degree of ENGINEER OF MINES, or BACHELOR OF PHILOSOPHY.

For admission, candidates for a degree must pass an examination in Arithmetic, Algebra, Geometry and Plain Trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. The next session begins October 2nd, 1873. The examination for admission will be held on June 2nd and September 2nd, 1873. For further information and catalogues, apply to

**DR. C. F. CHANDLER,**

Dean of the Faculty.

**ARMS, BELL & CO.,**

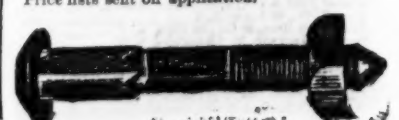
Manufacturers of

Carriage, Tire &amp; Square Head Bolts.

Cold Pressed Nuts and Washers, Etc.,

YOUNGSTOWN, OHIO.

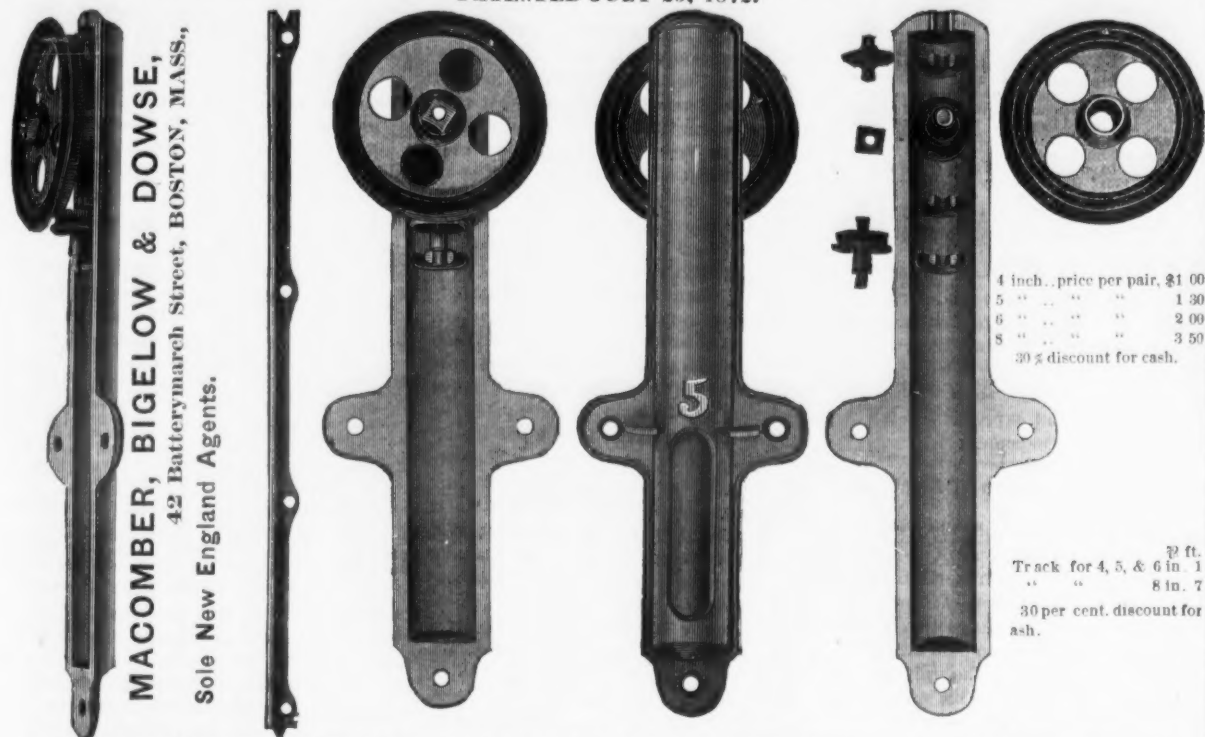
Price lists sent on application.





## PATENT NOVELTY HANGER,

PATENTED JULY 23, 1872.



**MACOMBER, BIGELOW & DOWSE,**  
42 Battery Street, BOSTON, MASS.,  
Sole New England Agents.

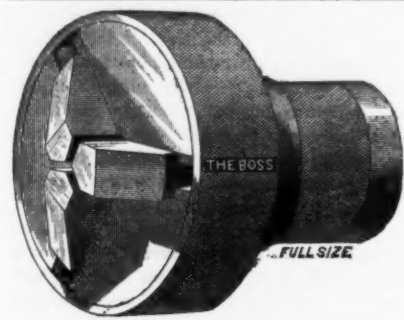
4 inch... price per pair, \$1 00  
5 " " " " " " " " 1 30  
6 " " " " " " " " 2 00  
8 " " " " " " " " 3 50  
30% discount for cash.

Track for 4, 5, & 6 in. 1  
" " " " " " " " 8 in. 7  
30 per cent. discount for  
ash.

We, without hesitation, offer this Hanger as the best article in the market for the purpose. Its many advantages over all other Hangers are as follows:  
1st.—It is more than **double as strong** as any other Hanger, owing to its semi-cylindrical or curved back.  
2nd.—It is provided with a friction wheel at the top of the Case, which bears against the rear or outside of the sheaves, and prevents it from **leaning outward** and causing it to **RUN TRUE**, a feature not attained in any other Hanger.  
3d.—By thus causing the sheave to run true, the doors are always held up **close to the Frame**, and maintain a close joint around it.  
4th.—The sheave has but one flange, there being a lower friction wheel provided with a flange which extends out under the face of the sheave and bears against the outer side of the track, which takes the place of the extra flange in the sheave, thus doing away with the **grooved sheave** which always grinds or breaks.  
5th.—**IT CAN NEVER RUN OFF THE TRACK.**  
6th.—It is the **easiest running** Hanger made, our 5 in. answering the same as 6 in. of the checkback and ordinary makes.  
7th.—It is the **Most Complete Hanger**, in its construction, being **tasty**, as well as **durable**.

**LOUDERBACK, GILBERT & CO., 53 Chambers Street, New York City.**

Also Agents for the **CONNECTICUT CUTLERY CO.**, of Naugatuck, Conn., and keep on hand a complete assortment of their goods.



## The BOSS Drill Chuck

is warranted to be the best and most perfect made Chuck in use. It holds from 0 to three-eighths inch, and is truly the Boss Chuck. Every piece is made of **Forged Steel**, and finished to a Gauge. Give it a trial and you will be satisfied; if not, return it at my expense, and your money will be refunded. Address

**A. F. Cushman,**

Manufacturer of all kinds of Lathe Chucks.

**HARTFORD, CONN.**

Patented Dec. 24th, 1872.

Orders from the trade solicited.

**E. C. C. KELLOGG**

PATENT.

Feb. 18, 1866.



## COMBINATION BELT PUNCH,

Pronounced by those who have used them the handiest and most desirable tool in use of its kind. As will be seen, the combination consists of

**BELT PUNCH, KNIFE AND AWL,**

Also, **Needle for Lacing Rubber Belting**, so combined that each tool does its specific work and not interfere with either of the others.

**E. C. C. KELLOGG & CO., Hartford, Conn.**

For Sale Wholesale and Retail by **ETNA NUT COMPANY, 97 Chambers Street, New York.**

## THE "WASHOE" TOOL MFG. CO.,

SOLE MANUFACTURERS OF THE



**Celebrated "Washoe" Rail Road and Mining Picks,**

including all other adze eye tools. First premium was awarded by the American Institute Fair in 1862, to this Company.

Have constantly on hand a large supply of **COAL, RAIL ROAD AND CALIFORNIA OR MINERS' PICKS**. We claim that **OUR PRICES ARE LOWER** and our picks are **SUPERIOR** to any thing in this country.

Liberal discount to large dealers. Send for price list.

Post Office Box 3170.

**J. J. Anderson, Prest.**

To insure attention all communications must be addressed to **H. H. TRENOR, Treas.**

**New York Office, 61 and 63 Park Place and 5 College Place.**

**Henry H. Trenor, Treas.**

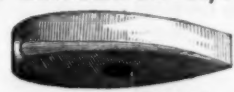
**John H. Allen, Secy.**

## NELSON TOOL WORKS,

157 East 32d Street, N. Y.,



Trade Mark, H. NELSON.



MANUFACTURERS OF

Mining and Paving Tools,  
H. Nelson's Solid Eye Pick,  
Klip Hammers,  
Stone Breakers,  
Masons' Pen & Scabbling Hammers,  
Hand or Mash Hammers,  
Chipping Hammers,  
Pickers' Hammers.

Shackel Bars,  
Block Stone Sledges,  
Mauls,  
Sledges,  
Blacksmiths' Sledges,  
Masons' Pick Hammers,  
Swedges, all sizes,  
Mill Picks, Crow Bars.

Smiths' Hand Hammers,  
Coopers' Hammers,  
Masons' Stone Axes,  
File Cutters' Hammers,  
Sinking Hammers,  
Fullers, all sizes,  
Horse Shoers' Tools,  
Rail Tongues.



Trade Mark, H. NELSON.

**HAMMERS** of all kinds made to order, on receipt of Pattern or Drawing. Special attention paid to R. R. Work.

## Embossed Dog Collars.

An improved style of Dog Collar made of **Oroide** and embossed with **Fancy Patterns**, which prevents their becoming tarnished or scratched. Also, **German Silver**, **Silver Plated** and **Bronzed**.

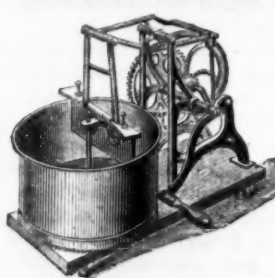
Manufactured by

**W. T. & J. MERSEREAU,**

62 Duane Street, NEW YORK.

For Sale to the Trade only.

## AMERICAN



MEAT AND

VEGETABLE

## CHOPPER,

Sold by Hardware Dealers.

**D. A. NEWTON & CO.,**

General Agents,

Have Removed to

106 Chambers Street, New York.

## Gray's Door and Gate Spring.

No. 2.

**Simple, Effective**

AND

**Easily Adjusted.**



MANUFACTURED BY

**Van Wagoner & Williams,**

27 Park Row, N. Y.

The sliding bolt "C" moves with the rod as the power is applied, and is slipped into the bracket "D," holding the rod at the desired tension.

**C. HAMMOND & SON,**  
Mfrs. of Hammers, Edge Tools, Railroad, Machinists' & Blacksmiths' Tools,  
Office and Sample Rooms, 13 N. 5th Street, PHILADELPHIA.

Unfinished Picks.....\$ 8.50 per doz  
Finished Picks.....10.00 per doz  
Finished Swedish Iron Picks...12.00 per doz



## Tucker's Alarm TILLS,

FOR SALE BY

**RUSSELL & ERWIN MFG. CO., New York,**

**PRATT & CO., Buffalo,**

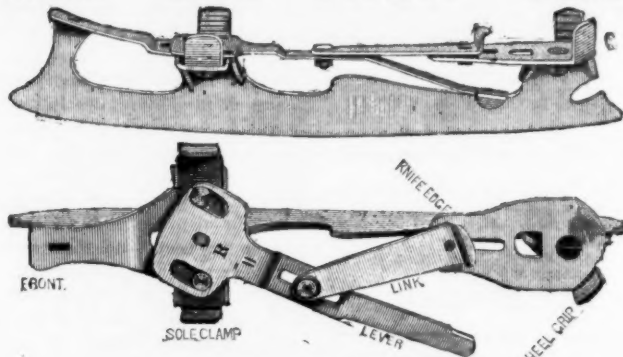
**LLOYD, SUPPLEE & WALTON, Philadelphia,**

**HIBBARD & SPENCER, Chicago.**

**JOHN NAZRO & CO., Milwaukee,**

**A. F. Shapleigh & Co., and E. C. Simmons & Co., St. Louis.**

## BRADFORD & ANTHONY, BOSTON, Skates and Skate Straps.



Agents in the UNITED STATES for

## FORBES' PATENT ACME CLUB SKATES.

The only reliable and really **SELF FASTENING SKATE** ever invented. Agents for

**WINSLOW'S SKATES.**

Send for Illustrated Catalogue.

## Plant Brothers, MANUFACTURERS



"COMMERCE,"

AND

## Commission Merchants,

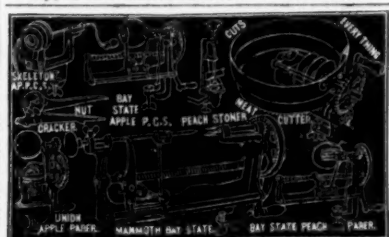
166 Bromsgrove Street,  
**BIRMINGHAM, ENG.**

MAKERS OF

## FILES, EDGE TOOLS & CUTLERY.

All descriptions of

Hardware, Hollowware, Brass Foundry,  
Machinery, Soft & Fancy Goods, etc.,  
Shipped on commission at lowest market rates.



## D. H. Whittemore,

Worcester, Mass.,

Manufacturer of the celebrated

**Bay State & Skeleton Apple Paring,**  
**Coring & Slicing Machines, etc.**

Sold by

**CLARK, WILSON & CO. and RUSSELL & ERWIN MFG. CO., New York.**

**WM. H. COLE, Baltimore, Md., and by dealers generally.**



## Cowdin Mfg. Co.,

Manufacturers of the

## DIAMOND

**FLINT AND EMERY**

**PAPER,**

**Flint & Emery Cloth.**

113 Chambers Street,

P. O. Box 3502. NEW YORK CITY.



# The Iron Age.

New York, Thursday, September 4, 1873.

DAVID WILLIAMS . . . . . Publisher and Proprietor.  
JAMES C. BAYLES . . . . . Editor.  
JOHN S. KING . . . . . Business Manager.

The Iron Age is published every Thursday morning, at No. 10 Warren Street, New York, on the following terms:

**SUBSCRIPTION.**  
Regular Weekly Edition...\$4.00 a year.  
Semi-Monthly... 2.00 " 1st and 3d Weekly Nos. in each month.  
Monthly... 1.00 " 1st Weekly No. in each month.  
To Canada, Weekly...\$ 4.40  
" Semi-Monthly... 2.40  
" Monthly... 1.24  
" Great Britain, Weekly... 6.00  
" France " 6.00  
" Germany " 8.00  
" Prussia " 8.00  
" South America " 8.00  
" Belgium " 8.00  
" Mexico " 7.00  
" Sweden " 12.00

**ADVERTISING.**  
One square (12 lines, one inch), one insertion, \$2.50;  
one month, \$7.50; three months, \$15.00; six months  
\$25.00; one year, \$40.00; payable in advance.  
All communications should be addressed to  
DAVID WILLIAMS, Publisher,  
10 Warren St., New York.

City Subscribers will confer a favor upon the Publisher, by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age*; also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

## CONTENTS.

**First Page.**—Fifteen-Ton Steam Hammer at the Vienna Exhibition. The Milwaukee Iron Company and its Works. Asbestos.  
**Third Page.**—New Patents. Vapor Power.  
**Fifth Page.**—Old Errors and New Truths Pertaining to the Crank Engine (concluded).  
**Ninth Page.**—Business Items. Vienna Premiums and Sewing Machines.  
**Eleventh Page.**—Correspondence.  
**Thirteenth Page.**—The Iron Age Directory.  
**Sixteenth Page.**—The Proposed Visit of the Iron and Steel Institute. The National Federation of Employers. American Merchant Bar for the English Market. Sage Opinions Concerning the Future of Iron. The British Iron and Steel Institute at Liege.  
**Seventeenth Page.**—A market for American Manufacturers in Great Britain. Scientific and Technical Notes.  
**Eighteenth Page.**—Trade Report.  
**Nineteenth Page.**—Trade Report (concluded). Our English Letter.  
**Twenty-third Page.**—New York Wholesale Prices of Hardware and Metals.  
**Twenty-fourth Page.**—New York Wholesale Prices (concluded).  
**Twenty-seventh Page.**—Philadelphia, Buffalo, and Pittsburgh Hardware and Metal Prices.  
**Twenty-ninth Page.**—Boston, St. Louis, Chicago, Detroit, Cincinnati and London Hardware and Metal Prices.

## The Proposed Visit of the Iron and Steel Institute.

It is now generally known that the British Iron and Steel Institute have accepted the invitation of the American Institute of Mining Engineers to visit this country in 1874, and hold one of their regular meetings in Philadelphia. The August meeting of the British Institute was held in Liege, Belgium, and before adjourning the question of accepting the invitation of the American Institute of Mining Engineers was taken up and favorably considered, as will be seen from the account of the first and second days' proceedings, published elsewhere. The meeting will probably take place in October of next year, at Philadelphia, and as ample time will thus be had for any necessary preparations, it may be confidently predicted that the British Institute will have a reception which will do credit to the society whose invitation they have honored.

Since the receipt of the cable dispatch announcing the action of the British Institute in the matter, there has been some disposition manifested to criticize the action of the associations representing the iron trade of the country, in permitting an association representing more especially the mining profession to carry off the honors of entertaining our English friends on the occasion of their first visit to America. We are not surprised at this, but when the matter is carefully and impartially considered, it will be seen that there is no occasion for any mortification on the part of the iron trade associations. The only thing to regret is that we have, in this country, no association devoted exclusively to the discussion of questions relating especially to the metallurgy of iron and steel, and, consequently, none which is to the iron trade of the United States what the Iron and Steel Institute is to the iron trade of Great Britain. The American Iron and Steel Association is organized for purposes other than the promotion of scientific, metallurgical and technical discussion, and there is nothing within the scope of its aims and efforts to render it either expedient or desirable that it should extend an invitation to our English friends

to visit this country. The same is true of other associations representing the iron interests of the United States. The National Association of Iron Manufacturers, the National Pig Iron Association, the Eastern and Western Iron Manufacturers' Associations, the National Associations of Nail and Stove Manufacturers, are all trade associations, and it is a provision of the constitution of the Iron and Steel Institute that matters pertaining to the trade in iron shall not be considered proper subjects for discussion at its meetings. The American Institute of Mining Engineers is, then, the only American association or society which could, with propriety, extend to the British Institute an invitation to visit the United States, and it is right and proper they should have the honor. We hope, however, that we shall not long be without a society devoting itself especially to the creation of an American literature relating to the metallurgy of iron and steel, to the investigation and discussion of new and improved processes, the spread of information useful to iron masters, and the promotion of scientific inquiry and experiments among those having the management of our blast furnaces, rolling mills, forges and foundries. There is abundant material out of which to form such a society in this country, and we trust the steps now taking to this end will be completely and promptly successful.

But although the iron masters of the United States have had no part in inviting the British Institute to this country, we feel justified in expressing the belief that our friends, the mining engineers, may confidently rely upon a hearty and liberal co-operation with all efforts which may be made to entertain their guests in a manner calculated to impress them with a favorable idea of American hospitality. There are many reasons why such action on the part of the iron and steel trades of the country would be both timely and proper. The British Iron and Steel Institute deserves well at our hands. During the five years of its existence it has accomplished much in the way of disseminating information of great and permanent value to iron masters at home and abroad, encouraging investigation and experiment, promoting a taste for technical discussion, and collecting and publishing practical knowledge which could not be gleaned from books in any language. For all this we owe the Institute a debt of gratitude. Again, it has been chiefly instrumental in promoting the introduction of several American inventions and processes into English iron works; a work which, though immediately benefiting individual Americans, has secured a recognition of American talent and skill which will result in ultimate benefit to the entire nation. For these reasons the American iron trade is under lasting obligations to the British Institute, and the occasion of their visit will be a fitting time in which to give it expression in words and actions. But there are other considerations which render it desirable that the English iron masters should carry home a good opinion of the iron masters of this country. There exists in Great Britain at this time a feeling against this country which is not conducive to the promotion of amicable relations between the two nations. The successful competition of the United States for the iron trade of Canada, South America and the West Indies, and for trade in manufactures of iron with markets England has hitherto monopolized, including some of her own colonies; the maintenance of a judicious, and, to us, beneficial tariff system; the knowledge that we have all the resources at our command wherewith to make iron for the world, and that it is only a question of time when England must withdraw from competition with us—all combine to create a bitter feeling of jealousy and distrust in the minds of British iron masters, as a class. That there are exceptions is shown by the fact that many English iron masters have already sought investment for their surplus capital in our iron and coal lands, doubtless with a view to transferring their business to this country when they can no longer follow it profitably in their own; and nothing would so promote this movement, which is almost without precedent in the history of trade, as a well arranged tour for our English visitors through those sections rich in resources of ores and fuel only partially developed for want of the capital which, so far as mining and iron making are concerned, no longer finds tempting opportunities for investment in Great Britain. That the Institute will come to us without prejudice, and with some idea, at least, of the wealth of our resources, may be confidently asserted. In his inaugural address, published in our issues of May 15th and 22d, Mr. J. Lowthian Bell, President of the Association, gave bold and fearless expression to the conviction already dawning in the minds of the more intelligent of British iron masters, in the following memorable words:

If, then, we have to apprehend the advent of a powerful rival in the iron trade, it is not, unless new discoveries are made, the Old World of Europe we have to fear, but the immense and undoubted powers possessed by the Western hemisphere. In

ores of the finest descriptions the resources of the United States are unlimited, while in coal our own wealth is, in comparison, but poverty. In many cases the relative geographical situation of these minerals is not unfavorable; in short, there is apparently but one bar to a boundless production of iron in the New World—that of human hands to manufacture it. The stream of emigrants, however, constantly flowing from this side of the Atlantic would seem to enable our friends on the other to advance at a rate unknown even in this country; for, according to the "Statistical Report of the National Association of Iron Manufacturers" of the United States, no less than 107 furnaces were erected there in 1873, which is equal to an increase of 18 per cent. of those in blast in 1870. In the matter of skill, everyone who has had the opportunity of inspecting the American iron works concurs in reporting that their development is quite in keeping with the advantages Nature has conferred upon that highly favored country.

A delegation coming thus in the spirit of friendliness, prepared to see and appreciate the elements of future national greatness in what we shall have to show them, should be received with a hearty welcome, liberally entertained, and sent home with kindly feelings that will find expression in a hundred ways in years to come.

## The National Federation of Employers.

As our readers have already been informed, an important movement is now on foot in Great Britain, which merits thoughtful and serious consideration. It is proposed to organize a national association of employers and capitalists, to oppose the organization of labor and defeat the aims and objects of the trade unions. This association, which has already made some progress, is called the National Federation of Employers, and includes in its membership the names of such eminent manufacturers as Sir Titus Salt, Sir John Crossley, Radcliffe & Sons, R. Haworth, Sharp, Stewart & Co., Robert Neil & Son, Joseph Simpson, Jones Bros. & Co., and very nearly all the leading employers of Sheffield, Birmingham, Bolton, Preston, Kidderminster, Oldham, Rochdale, and other manufacturing centers. It is stated that the united capital represented by the Federation already amounts to over a thousand millions of dollars, and the character of the movement is shown by the fact that Sir Joseph Whitworth has accepted the position of president. So far, then, as strength is concerned, the Federation is already quite able to lock horns with the most formidable of the trade unions.

Of the aims and purposes of the Federation we know only so much as its managers have seen fit to make public; but it is reasonable to suppose that they will not advertise its plan of operations for the information of the unions, who must be watching the progress of the new movement with profound alarm. What they say of themselves is, that the objects of the Federation are to promote and maintain such relations between capital and labor as will secure perfect freedom to each, and conduce to the welfare of both—a promise which, practically, means nothing at all. To attain this desirable result, the Federation is to keep one eye on Parliament, to see that no unwelcome laws are enacted, and the other on the trade unions, to see that they keep within bounds; to collect and disseminate useful information relating to the industries of the country, and endeavor to secure co-operation and unity of purpose in arranging or resisting demands made by trade unions upon employers in trades represented in the Federation, which is to act as a medium of communication between masters and men. Its plan of organization may be briefly described as follows: Local employers' associations are to be formed wherever there are enough employers to effect an organization, and all employers are permitted to join them upon certain prescribed conditions. These local associations may become branches of the National Federation upon payment of an entrance fee of 5 shillings to each £100 of the average amount paid weekly by the members as wages, and an annual subscription to the central treasury of the same amount, or rather, of an amount calculated on the same bases of 5 shillings to the £100 disbursed weekly as wages. The National Federation is to be managed by a president, treasurer and council of from twenty to fifty members, to be elected annually. The council is to meet quarterly, or oftener, at the call of the president; three members of the council, or twelve members of the Federation, have power to call a meeting of the council, and a quorum of the council have power to call a meeting of the Federation at any time.

Obviously, such an association as this has not been formed for the purpose merely of securing fair play for both sides in the contest between labor and capital now waging. If it had been, the trade unions would have been invited to elect a representative of their best men to the National Federation, that both sides might be fairly represented in any debate upon questions affecting their common welfare. As it is, only employers are eligible to membership, and the workmen may well distrust the sincerity of the promise that their interests will be looked after—at least, in the sense in which they would like to interpret that promise. We may therefore conclude that the Federation is nothing else than an organization of capital against labor, having for its true object the breaking up of the

unions, the defeat of their plans and purposes, the depression of wages and the restoration, so far as may be possible, of the condition of affairs that prevailed before labor found out it had any power to oppose to that of capital which, in England, was employed to oppress it. No other conclusion can be reached from a careful consideration of the facts before us, and we cannot think that it would have been better in all respects had the Federation declared openly and honestly its objects, if not the means by which it hoped to secure them.

That the British workmen, by undue exercise of the power secured through organization, have invited organized resistance on the part of employers, must be admitted. Up to a certain point our sympathies were with the English workman, but he has, to a great extent, forfeited that sympathy by pursuing a policy at once foolish and impolitic. From an oppressed and submissive servant he has become a tyrant, oppressing alike his master and his fellow workmen. His new found power has been misused, and he has played the part of the matador in the bull ring, rather than that of the hero who dared to oppose the power which sought to keep him from the enjoyment of a just share of the profits of production. Employers, therefore, are not without provocation in this matter, and that they "mean business" is shown by the manner in which they have taken hold of the movement for their own protection. The question arises, however: Is the course they have adopted a wise one, and will it result in benefit to the industrial interests of the country? We think not, but our limited space necessitates that we should reserve our reasons for so thinking until our next issue.

## American Merchant Bar for the English Market.

Although there have been many rumors of late of the receipt by American manufacturers of orders for iron to be sent to England, as well as of shipments actually made from this country, it has been difficult and, in some instances, impossible, to obtain specific information respecting such orders and shipments. We are now able to give the facts respecting one English order received, which, whether it be the first or not, is certainly a matter of much interest to the iron trade of both countries. Messrs. Jackson & Chase, of this city, dealers in iron and steel, have received an order for one hundred tons of round and square merchant bar iron, ordinary specifications, of good quality. This order is not received from a consumer, but from an iron dealer of Liverpool, who buys to sell again. The terms upon which the order was accepted are private, but we are able to state that, while the sellers are satisfied with the price received, the buyer will be able to take the iron to England and sell it profitably in competition with merchant bar of English make. It is a *bona fide* sale of iron for export, not a consignment, and the only possible reason which the buyer could have had for purchasing was the opportunity afforded to make money by the transaction. These facts have not come to us at second hand. We have them direct, and our authority is the firm by whom the order was received and accepted.

Of the significance of such a transaction we need speak but briefly. No one should conclude from the facts above stated that we are about to export largely of merchant bar, or any other kind of iron, to England, but, in connection with the statements made by our intelligent and trustworthy correspondent in Sheffield, whose letter will be found on another page of this issue, they show with startling clearness the condition of the British iron trade at the present time. That such a condition of affairs can long prevail we do not believe, but the causes which have brought it about are not temporary in their nature or operations, and England need not expect that she will ever again be in a position to compete with the world, as heretofore, for the lion's share of its iron trade. America has entered the field, and her strong hand has grasped the iron scepter which has so long been the symbol of England's commercial sovereignty.

## Sage Opinions Concerning the Future of Iron.

Our neighbors, the *Tribune* and the *Times*, gave their respective readers on Tuesday last, articles on the condition and prospects of the iron trade at home and abroad, which cannot be said to be very important contributions to the public knowledge on this important subject. The *Times* correspondent—whom we suspect is the individual who startled us last winter by asserting that the furnaces of Pennsylvania were making more pig iron than all Europe together—shows his ignorance of the subject in various ways, especially in the following paragraph:

Mr. Jones, of the firm of Jones & Laughlin, a firm employing about 2500 men, and having a business which uses a capital of some \$3,000,000, has openly expressed his opinion that America was more

likely to import more iron from, than she exported to, Europe, in the next ten years—much as he wished it might be otherwise. But this very same gentleman is an advocate for retaining the tariff on imported iron. Why so, if he thoroughly believes what he asserts? I feel inclined to quote against him the remark which Shakespeare puts into the mouth of the dying king, when he sees Prince Henry trying on the crown, thinking his father to be dead:

"Thy wish was father, Harry, to the thought."  
That the writer should have discovered any inconsistency between a belief that we should import largely during the next ten years and a desire to see the tariff maintained, indicates the peculiarity of the mental processes by which his opinions are formed.

The *Tribune* contributor shows his knowledge of the subject by the following presentation of the reasons for the present depressed condition of the iron trade:

The reduced demand for railroad iron in the West and South has brought Western iron masters into the Eastern market, and their cheap competition with the Eastern manufacturers, together with the constantly increasing quantity of ore obtained with the opening of new mines, beside the effect of stringencies in the money market, have lowered the price of American iron so far as to leave little or no profit for the rolling mills and other iron manufacturers. The expense of getting out the ore is so low that the mining companies still make money, but the manufacturers have been forced to try to open new markets, have invaded Canada, where American iron was never before sold, and have even tried to enter England itself, the traditional home of the iron industry.

The Western iron masters will, doubtless, be pleased to learn that the abundance and cheapness of ores are among the causes contributing to the present dullness. But the writer, evidently distrusting his own knowledge, has interviewed a number of gentlemen more or less prominently connected with the iron trade, and gives their opinions in place of his own. This was the part of wisdom, it must be admitted, but we cannot but think the gentlemen interviewed would have done well to have given the interviewer their opinions in writing. This business of reporting conversations from memory often leads to the publication of very foolish statements. There is, of course, no possible objection to newspaper discussion of the state of the iron trade, for it is certainly a very interesting subject just now, but we would respectfully suggest to the conductors of our daily newspapers that it would be better to obtain their information in the form of communications from responsible and well-informed sources, than to get it second hand through the medium of reporters, whose memory cannot always be trusted in reporting conversations upon a subject of which they know nothing, and which cannot be learned in an hour or a day.

## The British Iron and Steel Institute at Liege.

On the 18th of August, ult., the British Iron and Steel Institute assembled at Liege, Belgium, for their semi-annual meeting. The following communications, sent us by our English correspondent, describe the proceedings of the first and second days:

**LIEGE, Monday, Aug. 18.**—To-day, a little after noon, the invading army which has been enlisted in the iron-working districts of England, Scotland, and Wales, made its triumphal entry into the city of Liege. At the railway there were plenty of Englishmen, and fraternizing took the form of musical cheering on the part of the English in the carriage and the Belgians on the platform. There was also a great deal of noise produced by a long-continued *vue de joie*, aided by the band of the city pompiers, who played "God Save the Queen." Then the visitors were conducted to the private carriages, which the gentlemen of the city and the neighborhood had placed at their disposal, and were driven through a beautiful avenue of trees up to the Fluce de Theatre, three-quarters of an hour afterward. A guard of honor, stationed upon the outside stone staircase which leads to the principal entrance to the Hotel de Ville, presented arms as the members of the Institute who had removed their travel stains, passed into the entrance hall. The worthy burgomaster of Liege, standing in the middle of the beautifully decorated *Salle des maneges*, received the visitors most cordially. Mr. I. Lowthian Bell, the president of the Institute, Mr. Alexander Brogden, M. P., and several other of the leading members, were personally introduced to the burgomaster, who then proceeded to deliver, from a tribunal near the center of the room, a most animated address (in French), in the course of which he made special reference to the connection between the development of such industries as those which are particularly associated with the work of the Institute, and the development of social and individual liberty. The president of the Institute replied, evidently much to the delight of his Belgian auditors, in French, and paid the burgomaster a happy compliment as the representative of the system of local self-government which, in such countries as England and Belgium, had done so much to uphold liberty. The burgomaster then proposed "The Iron and Steel Institute," and the *vin d'honneur*, which I may translate as the "Loving Cup," was presented to each of the guests. The next item in the day's programme involved a general adjournment to the elegant theatre, in which Mr. Bell took his seat as president, and the actual business of the congress commenced; and it was a subject of remark among the members that the Institute had never commenced a meeting under such favorable and even brilliant auspices. The president read his inaugural address, which is of considerable length, in French. It consisted of a comparison, which was very copiously illustrated by elaborate and carefully prepared statistics, between the conditions under which the manufacturing supremacy of England has been maintained, and those which pre-



vail in the manufacturing districts of Belgium, France, and Germany. This naturally led Mr. Bell into the question of how far the mode of living of the artisan classes is affected by the prevailing conditions of the surrounding population. Upon this point, after giving some statistics to show that when "living is cheap wages are low," he said: "It might at first sight seem immaterial what a man's wages were, provided the cost of the necessities of life corresponded with the rate of pay. It is, however, a remarkable fact that, as a rule, however low-priced provisions may be in these cheap countries, labor is paid for on such a scale as to compel the greater portion of the working population to subsist on very miserable fare." This general question formed the subject of the president's address. He arrived at the conclusion that the supremacy hitherto enjoyed by Great Britain has not been the consequence of any facility which she possesses over other countries for getting a given amount of work done for a less sum than it would be necessary to pay in Belgium, France, or Germany. On the contrary, he holds that in this respect we actually stand in less favorable position than those countries. The solution of the problem is, Mr. Bell alleges, the simple fact that England has possessed "what hitherto may have been regarded as unlimited powers of production in respect to her fuel." How far this condition of success may be affected by the recent enormous increase in the price of coal, Mr. Bell declines to hazard an opinion, but goes on to suggest that "most instructive lessons in the all-important science of political economy are involved in the experience of the last year or two, and that members of the Institute had better apply their minds to finding out exactly what these lessons are." Better advice could not be given by anyone in Mr. Bell's position, especially as he has supplied in his address plenty of material for cogitation. The address of the president was replied to by M. L. Trasenster, the president of the committee of reception. Some business announcements were made, including one which seemed to give great satisfaction to the assembled Britons, and which referred to the proffered hospitality of the King of Belgium, of which I have already informed you, the *seance* ended, to be resumed for the reading of papers and discussion.

**TUESDAY.**—The brilliancy of the fête which was given last evening in the Zoological Gardens was marred by the unfavorable state of the weather. The display of fireworks was postponed and will be held instead to-morrow on the Quai de St. Barbe, opposite the building where the grand banquet is to be given. This morning the members of the Institute held a second meeting, and several papers were read. It was announced that the members were invited to hold the meeting next year in the United States. At the close of the sitting a visit was paid to the public buildings of Liege, and the members will be received this evening separately by different leading manufacturers. Great preparations are now being made for a serenade which is to be given to-night on the Place du Theatre. The Square will be brilliantly illuminated.

#### A Market for American Manufactures in Great Britain.

To the Editor of *The Iron Age*: Two months of the present year spent in various parts of England, from Yorkshire to Devonshire, and from Lancashire to Kent, with no inconsiderable amount of observation, have served to satisfy me that there are a vast number of implements, appliances, and products of our diversified industries which are infinitely superior, in proportion to their prices, to anything which the English make for the same uses. Further, that in the very home of our old industrial rival there is to-day a vast market, which invites us to take possession of it, and which can be taken and held by means of a sufficient concentration of capital, a knowledge of English trade, and a good deal of vigorous and judicious advertising—the management of the latter being, as I think, one of the few business qualities in which the English surpass us.

By entering this field, not only may we make large sales for English consumption, but, once fairly established upon the spot, quantities can be sold for export to the various nooks and corners of the world wherewith Great Britain trades, but which cannot be shipped from here for a want of the shipping and trade facilities which are alone possessed by that country.

The insignificant amount of our exports of manufactured goods, compared with that of Great Britain, is by no means alone attributable to the superiority or cheapness of British manufactures as compared with ours, but largely to the following causes:

1st. The aggressive nature of British foreign trade for centuries past, the control of foreign markets, and the facilities for reaching them, which are superior to those of any other people.

2d. The limited home market of Great Britain, compared with our own, owing to the poverty of the great mass of her people preventing them from becoming large consumers, and rendering it absolutely necessary to seek markets abroad for a great part of the products of her extensive industries.

3d. The difficulty in England of finding remunerative employment at home for intelligent and enterprising men without capital, there thus always being a large body of such men who are quite ready to go into exile for the sake of employment, and who thereby assist in carrying out the aggressive system of English foreign trade.

In my humble opinion the time has arrived for American hardware, edge tools, stoves, &c., &c., to be largely sold in the markets of Great Britain for home consumption and for export, and I would suggest that ten, fifteen or even twenty of our most extensive and wealthy manu-

facturers of such articles, in conjunction with Englishmen of capital who understand the trade, establish in England a company of, say, £100,000, or more capital under the English limited liability laws, which are extremely liberal in their provisions, and let this company enter upon the sale of a full line of American goods of these descriptions. Depend upon it, with judicious management, a business of many hundreds of thousands of pounds per annum may be built up in the course of a very few years. In stoves alone an immense business may, in the immediate future, be done, the high price of coal rendering economy in its use at once necessary, and requiring the substitution of stoves for the open grates, long so popular in England, and which, according to a high English authority, "probably deliver to our apartments an amount of heat which may be represented as one-twentieth of the total heat capable of being extracted from the fuel they 'consume.'" In the past great prejudice has existed among our cousins across the water against stoves, but this prejudice must give way to the necessities of the times, and here we may reap a large and immediate harvest.

As an indication of what it is possible to do in this field with enterprise and management, I would instance a valuable pharmaceutical preparation emanating from New York, and which, by means of agencies in Liverpool, London and elsewhere, and liberal and judicious advertising, has been pushed into general use in every nook and corner of England. I never failed on inquiry to find it in any drug store there, either metropolitan or provincial. Again, American organs, harmoniums, etc., are being largely introduced there, and indeed the prefix "American" to almost any article is considered a recommendation for it.

In conclusion permit me to beg most earnestly that the parties interested will for themselves examine into this important subject, and I believe that their own judgment will confirm that of

Very truly yours,  
HENRY CAREY BAIRD.

PHILADELPHIA, August 18, 1873.

#### Scientific and Technical Notes.

A series of interesting  
SUBMARINE BLASTING OPERATIONS IN THE  
SCHUTTKILL RIVER

are now in progress, having for their object the removal of rocks which impede navigation. Two months ago work was commenced at a point where 800 cubic yards of rock had to be removed so as to make the channel 19 feet deep at low tide. Three kinds of rock were found—one of soft mica, another of feldspar and quartz, very hard, and the third of a hard, dark sandstone. To remove these rocks, holes  $3\frac{1}{2}$  to 4 inches in diameter, and 5 or 6 feet apart, were bored to the required depth, which varied, of course, with the size of the obstruction. Burleigh's steam drill was used. This drill, which in a compact form comprises an engine and the drill proper, is mounted on a tripod with telescopic legs, to conform to the irregularities in the bottom of the river. Steam is supplied through a flexible hose from a boiler on the workmen's scow, and the drill is made to give from 150 to 200 blows per minute. The drills are from 16 to 18 feet in length, rose bitted, with four lips of cast steel from  $3\frac{1}{4}$  to 4 inches in diameter. The drill is connected directly with the piston of the cylinder, and is given two motions, perpendicular and rotary. It is self-feeding, and as the work proceeds, the cylinder of the engine follows the drill, thus allowing a play of about 3 feet with each one of the drills of different lengths. The holes are bored from 3 to 11 feet deep, and with this machine about 18 feet are bored each day. Water is pumped into the hole made by the drill during the operation to wash out the sediment, and, when completed, the holes are plugged up by a diver, a rope connecting all the plugs and guiding him to the several holes. The diver is dressed in an India-rubber suit, with copper helmet and breast-plate, lead shoes, and heavy weights are fastened to his side. The helmet weighs 80 pounds, the sinking weight 200 pounds, and the suit about 40 pounds, so that the diver carries 380 pounds into the water. Few men can bear the load in ascending and descending, but in the water the weight is not felt, and the diver can work at the bottom of the river for many hours without extraordinary fatigue. The copper helmet is very large, and has three glass windows in it; the look like the port holes of a ship. When these are closed the diver's only supply of air is from an India-rubber tube into which air is continuously pumped by two men. The air circulates about the man's head and escapes at the back, but any stoppage of the supply would result in almost instant death. The diver first sets the drill in position, then returns and plugs up the hole, again returns, withdraws the plugs, and puts in place thereof duallin cartridges, and after the blast has been made, again descends to put chains around the heavier rocks, that they may be lifted out of the river. The advantage of using duallin instead of powder is that, as a general rule, it reduces the rock to powder, or breaks them up into such small pieces that they can be removed by means of the dredger. The duallin cartridges used are from 4 to 8 inches in length, and sometimes several are used in one hole. They are fired off by means of an electrical battery, to which is attached an insulated line terminating in metallic fuses fastened inside of the cartridges.

Prof. Scheerer, of Freiberg, prescribes the following as the best and simplest process of ELIMINATING PHOSPHORUS FROM CAST IRON, and which, it is claimed, yields superior bar iron from phosphurized cast iron, at practically, no increase of cost. Chloride of calcium and common salt fused together, in about equal proportions, are intimately mixed with the molten iron in the puddling furnace, either by adding gradually in two pound water-tight paper packages, or placing the whole quantity required upon the bed of the puddling furnace at first, and, in either case, very thoroughly working it with the iron. The puddling process is generally so much shortened that the consequent diminution of the waste of iron almost offsets the cost of the material added. The quantity of the mixed chlorides required is about three times that of the phosphorus present in the cast iron. The presence of other chlorides, as of manganese, iron, and magnesium, interferes with the process, and renders a large excess of chloride of calcium necessary.

#### Special Notices.

##### OFFICE OF Walter A. Wood Mowing & Reaping Machine Co.,

HOOVER FALLS, N. Y., August 22, 1873.

To Our Agents and Patrons:

We have been asked by a number of our agents and friends to give them a true statement of the facts connected with Award of Prizes on Mowers and Reapers at the VIENNA EXPOSITION.

In answer we would say, that the **GRAND DIPLOMA OF HONOR**, the highest honor at the gift of the Exposition, has been awarded to WALTER A. WOOD. He was the ONLY manufacturer of Mowing and Reaping Machines who received the **DIPLOMA OF HONOR**, and only FIVE Diplomas were awarded to individual citizens of the United States.

This award was made after severe tests IN THE FIELD. Some of our competitors were awarded medals of "MERIT" and "PROGRESS," but none of them the GRAND AWARD.

Our victory at the Paris Exposition in 1867 is again repeated at Vienna in 1873, and we congratulate ourselves and our patrons on this brilliant success at these great International Expositions.

In our own country our success has been equally complete, as indicated by the largely increasing demand and sales of the past harvest.

Very truly yours,

WALTER A. WOOD, President.

#### Iron and Steel Trade.

A first-class New York City Iron house who would like to extend their business in supplying customers with Homogeneous Steel Boiler Plates, now so successfully making the plates of the best brands of Charcoal Iron, milled iron; Steel Bars of the same stock, in rounds, squares and flats; also heavy Steel Forgings, acting as sole representative in this market of one of the largest and most successful Steel Works in the country; may address, confidentially,

Office of *The Iron Age*, 10 Warren Street, N. Y.

#### TO FOUNDRYMEN.

A Pattern Maker in Metals  
For fine castings, wants to get a situation. He is reliable and perfectly competent.

Address  
A. J. WHITE,  
319 Pearl Street, New York.

IVES & ALLEN, Montreal, P. Q.

Hardware, Stoves, Hollowware,  
Ornamental Iron Work, &c.

Agents for American manufacturers of Hardware and Machinery. Consignments Solicited.

#### Wanted.

A first-class man to take charge of a Puddle Mill and a Merchant Mill. None but a thoroughly competent person need apply. Also a Founder, for an Anthracite Blast Furnace. He must be fully conversant with the duties of his position in all its details.

Address  
IRON,  
Box 473, Pottsville, Schuylkill Co., Pa.

#### Warfords, Robinson & Co., LINE OF 37 BARGES

FOR TRANSPORTATION OF

Lumber, Coal, Iron,  
and all heavy freight, between

Troy, New York, Providence,  
and all intermediate places.

180 Broadway, WEST TROY,  
28 Lumber District, ALBANY,  
19 Counties Slip, N. Y. CITY.

#### Translations and Condensations.

The undersigned, commercial Editor of *El Cronista*, the Spanish Government paper in this city, and Foreign Editor and Translator of the *Daily Bulletin*, has made it a specialty for years past to translate industrial matter, with the strictest adherence to the technical wording, from and into English, German, Spanish and French, for manufacturers, patentees and others, and begs to be recommended to the iron masters and readers in that capacity.

C. KIRCHHOFF, Box 2806, Post Office.  
Latest Publications translated by C. Kirchhoff.  
"German Imperial Consular Instructions." "Cuba may become Independent." Officially endorsed by the government of Germany and Spain.

#### To Furnace Men and Malleable Iron Manufacturers.

For Sale or to Let.—The McHaffie Steel Co.'s works at Lanokin, on the P. W. & B. Railroad, at its junction with the Baltimore Central, comprising Foundry, Annealing Furnaces, Machine, Blacksmiths' and Carpenter's shops, &c., &c. These works are most eligibly located, and with ample facilities for doing a large business. Parties desiring such property are requested to apply in person at the Works, or by letter addressed to "The McHaffie Steel Co.," Chester, Delaware Co., Pa.

R. T. HAZELL, AUCTIONEER.

#### By R. T. Hazell & Co.,

Store No. 118 Chambers Street.

Our REGULAR SALES OF HARDWARE, CUT LERY, FANCY GOODS, &c., will be held on TUESDAYS and FRIDAYS throughout the season.

CASH ADVANCES made on CONSIGNMENTS without additional charge.

#### MANUFACTURERS

desires of introducing their goods to the British and Continental Markets, are invited to insert advertisements in the newspaper "THE IRON," published every Saturday, at 99 Cannon Street, London, E. C.

SCALE: First 3 lines, 3/4; every additional line, 10d. Price, 6d. per Copy, or 30/- per annum, inclusive of postage to the United States.

#### To INVENTORS

MANUFACTURERS

The Managers of the 43d Exhibition of the American Institute, of the City of New York, beg to announce, that the Exhibition Buildings on 24 and 26 Avenue and 63d and 64th Streets, will be open for the reception of heavy Machinery August 15th and for other articles, September 1st 1873. The Exhibition will be formally opened September 10th.

For particulars, address "General Superintendent, American Institute, New York."

#### Special Notices.

##### THE CANADIAN BANK OF COMMERCE.

Capital - - \$6,000,000, Gold.  
Surplus - - \$1,500,000, Gold.

The New York Agency, No. 50 Wall Street, buys and sells Sterling Exchange, makes Cable Transfers, grants Commercial Credits, and transacts other Banking Business.

J. G. HARPER, Agents.  
J. H. GOADBY, Agents.

#### FREELAND TOOL WORKS,

(late A. M. Freeland), 526 & 560 West 34th Street, N. Y.

The undersigned, having succeeded to the business of the late A. M. Freeland, and having been in his employ for many years, are now prepared to receive orders for First-class Engineers' & Machinists' Tools; Guide and Standard Screws, cut to order; Surface Plates and Straight Edges of superior quality, on hand and made to order.

THOMAS & CO.

#### CIRCULARS

addressed to reach the

#### HARDWARE

and other lines of trade throughout the UNITED STATES.

Names of parties in various business selected with a view to their Mercantile Standing.

ALSO PUBLISH

#### Trade Registers

OF

#### Hardware and Kindred Interests,

MACHINERY

and Kindred Interests.

Very desirable advertising mediums to all interested in these trades.

#### The Merchants & Man'rs Agency,

4 Warren St., N. Y., Publishers.

#### NOTICE.

Our only authorized Agents to collect money for anything connected with our publications will invariably be provided with a letter of authority, specifying the particular object for which it is given, and bearing our official seal, and signed by the Manager.

The Merchants and Manufacturers Agency,  
4 Warren Street, N. Y.

#### DAYTON & LAMBERSON'S

(Copyrighted Revised Lists.)

#### DISCOUNT BOLT LIST.

Book form, Common and Philadelphia Lists, 30 discounts.

#### DISCOUNT SCREW LIST.

On Card Board or Paper, 15 discounts.

Bolt List, single copy, \$1.00; two or more, 75 cents each.

Screw List, single copy, 1.00; two or more, 75 cents each.

Mailed, in perfect order, prepaid on receipt of price. Address FRANK DAYTON, 83 Duane St., N. Y.

#### STERLING

#### IRON & RAILWAY CO.

MAKERS OF

#### STERLING

#### ANTHRACITE PIG IRON

FOR FORGE AND FOUNDRY USE.

A. W. HUMPHREYS, Treas.,

42, PINE ST., N. Y.

#### "ENGINEERING,"

A Weekly Illustrated Journal, edited by W. H.

MAW and JAMES DREDGE.

OFFICES: 137 Bedford St., Strand, London, W. C.

152 Broadway, New York.

#### CEO. ED. HARDING, C. E.

Representative in United States.

This most successful English Engineering Journal, containing thirty-six pages, weekly, illustrating the latest advances in Civil, Mechanical, Mining and Military Engineering Science, both in Europe and America, can now be obtained by American subscribers, post paid, for \$2.00, currency, per year, sent to the New York office of the Journal.

All the important details of the buildings and novel machinery at the great Vienna Exposition will be illustrated and described in *Engineering* the current year; and this, with illustrations of all the larger American engineering structures, will render it invaluable to every American Engineer, Architect, Iron Master and Machinist.

The best medium for advertising American Machinery to the attention of European capitalists.

Send for specimen copy, free.

NEW YORK, July 1, 1873.

#### For Sale, &c.

#### Hardware Business

For Sale.

An established Wholesale and Retail Hardware and Cutlery Business, in New Haven, Conn. Centrally Located. For particulars, address, giving full name.

P. O. Box 779, New Haven, Conn.

#### Rolling Mill Machinery For Sale

One train, 8 high, finishing rolls, with steam engine 75 H. P.; and balance wheel, 20,000 lbs.—complete and in good order—by

Fearing, Rodman & Swift,

23 & 25 Commercial Street, Boston.

Boston, Nov., 30, 1872

#### For Sale,

A Five Ton Differential Iron Pulley Block, with about 25 feet lift of chain. Made to order in the best manner. Also a two ton block, same lift of chain. Will be sold cheap.

M. J. POWER,

218 E. 35th Street, New York.

#### For Sale, &c.

#### FOR SALE.

#### Machinists' Tools, Patterns, &c.

The Hope Iron Works, Providence, R. I., can templating a change in their business, offer for a large and valuable collection of Machinists' Tools which have all the latest improvements.

#### Blacksmiths' & Pattern Makers' Tools.

Also a large and varied assortment of patterns more extensive than usually found. They also offer Patterns and Special Tools for the manufacture, among others, of the following specialties, which equal, if not superior, to any made:

Hangers, Pulleys and Couplings.  
Gear Pump.  
Portable Engines of all sizes.  
Hoisting Engines of all sizes.  
Boiler Fronts and Fittings.  
Grind Stone Troughs.  
Tools and Fixtures for Blacksmiths.  
Lathes and Planers.

Many of these specialties would make a business, and are worthy the attention of machine shops and foundries looking for business. Address

JOSEPH P. MANTON, Providence, R.

#### PUBLIC SALE

#### OF VALUABLE REAL ESTATE,

Late the property of GEORGE MERKEL, deceased, of Greenwich Township, Berks county, Pa. By virtue of an order of the Orphans' Court of Berks county, the administrators of George Merkel, deceased, will sell at Public Sale, at the Keystone House, Reading, Pa., Saturday, Sept. 13, 1873, at one o'clock, P. M., a certain *Messuage, Tenement, and Tract of Land* situate in Richmond Township, Berks county, containing 175 1/2 acres, more or less. The improvements are a STONE DWELLING HOUSE, STONE BARN, and other buildings. The land is in good cultivation as a farm. This tract land contains a body of

#### HEMATITE IRON ORE.

known as the *Moslem Iron Ore*. This ore has been known for years past as the best iron ore in Pennsylvania. The ore bank is situate four miles from the East Pennsylvania Railroad, one mile from the Berks County Railroad, and four miles from the Philadelphia and Reading Railroad. The ore on this tract of land has been known for years past as being of the best quality. It has been used in both charcoal and anthracite furnaces with equal success.

The Conditions of Sale are the payment of percent of the purchase money at the time of sale, and the balance on 1st of January, next, when a deed and possession of the premises will be delivered.

WILSON R. MERKEL, Administrators of

WILLIAM M. KAUFMAN, (Geo. Merkel, Deceased).

#### Jobbing Hardware Business in St. Louis

#### FOR SALE.

Our senior being desirous of withdrawing from all active business, we have concluded to sell our stock and good will. We have an excellent corps of well disciplined clerks, and parties desirous of engaging in Hardware in our "Future Great City" can avoid the profitless probationary years of its construction by stepping into this well established business. If necessary, our junior might retain an interest. For further information, apply to us or Messrs. Hermann Boker & Co., 101 Duane St., N. Y.

McLARAN, WILLIAMS & CO.,

St. Louis, Mo.

#### IRON ORE FOR SALE.

We have a Magnetic Iron Ore of Superior

quality, that we can deliver at Piermont or Southfields, on Erie Railroad, in quantities to suit.

WM. E. COFFIN & CO.,

Boston, MASS.

#### For Sale or To Let.

The Store Foundry lately occupied by Munsell & Thompson, situated at Elizabethport, N. J.: can be adapted to any manufacturing purpose, having coal and iron within one block, direct from the mines. Communication with New York 32 times a day by rail, and 4 times by steamboat. Within half a block of the river. Will be let for one or more terms of years. Apply to or address

A. HAZZ & CO.,

32 Broadway, N. Y.

#### Hardware Business

#### FOR SALE.

The undersigned design going into the exclusive

Iron and Heavy Hardware trade, and offer their well established business in Shelf and Builders' Hardware For Sale.

WEBSTER & YEOMANS,

Danville, Ills.

For information, address,

Sargent & Co., New York; Miller Bros. & Kepp, Chicago, Ills.

#### BUSINESS CHANCE.

#### HARDWARE BUSINESS

#### FOR SALE.



# Trade Report.

Office of THE IRON AGE,  
WEDNESDAY EVENING, Sept. 3, 1873.

The past week has been characterized by greater activity in the money market and a stiffening in rates, which, on call loans, have advanced to 4 @ 7 per cent. For mercantile paper the rates are 7 per cent. for short date and 8 @ 10 per cent. for four and six months' acceptances.

The operations of the gold clique have caused a further advance in the premium during the week, but it is now generally believed that their threats of precipitating another "Black Friday" panic have been made chiefly to enable them to unload. To carry out their plan they have made cash gold as scarce as possible, and borrowers have been compelled to pay for its use. The following table shows the daily range of the premium:

	Highest.	Lowest.
Thursday	115 1/2	115 1/4
Friday	115 1/2	115 1/4
Saturday	115 1/2	115 1/4
Sunday	115 1/2	115 1/4
Tuesday	115 1/2	115 1/4
Wednesday	115 1/2	115 1/4

The Treasury programme for September, published on Monday, provides for the sale of \$6,000,000 gold, \$1,500,000 every Thursday, and the purchase of \$500,000 five-twentieths for the sinking fund on Wednesday, the 17th.

The stock market has been inactive, and but few transactions reported. The principal dealings have been in Pacific Mail, Western Union, Erie, Lake Shore, Union Pacific and Ohio & Mississippi. The highest and lowest of to-day's quotations are given below.

The bond market has been inactive, but prices are firm and have advanced with gold. The closing quotations are given below.

The bank statement shows a reduction of \$2,852,100 in the total reserves, and of \$7,233,500 in total liabilities. The decrease in specie in the face of the sale of \$1,500,000 and the prepayment of September interest is explained by the customs payments into the Treasury and the transfers by members of the Syndicate of a part of the Geneva award from the banks to the Treasury. The banks now hold in lawful money \$5,904,450 above what would be a 25 per cent. reserve, against \$6,950,175 last week. The following is a comparison of the averages of the past two weeks:

	Aug. 28.	Aug. 30.	Differences.
Loans	\$289,331,800	\$288,883,000	Dec. \$1,048,800
Specie	23,144,200	23,093,300	Dec. 2,049,000
Circulation	37,314,400	37,381,300	Dec. 67,900
Deposits	221,691,200	220,890,200	Dec. 7,391,000
Legal tend.	45,532,400	44,729,300	Dec. 803,100

The following tables show the foreign trade movements for the week:

	1871.	1872.	1873.
Tot. for week	\$2,771,076	\$1,092,938	\$2,463,334
Prev. reported	\$23,447,738	\$28,972,269	\$27,546,186

Since Jan. 1... \$262,218,574 \$300,065,207 \$270,061,520  
Included in the imports of general merchandise for the week are:

	Quant.	Value.
Anvils	73	\$1,191
Brass goods	30	4,125
Bismuth	1	455
Bronzes	37	6,560
Chains and anchors	83	4,927
Copper	1,357	1,357
Cutlery	167	7,149
Gas fixtures	1	75
Guns	137	14,481
Hardware	14	1,770
Iron, pig	1,407	40,832
Iron, sheet	261	47,918
R. R. bars	7,898	124,755
Iron cotton ties	527	1,885
Iron, other	1,450	7,146
Lead, pig	1,017	64,819
Metal goods	207	23,571
Nails	51	663
Needles	27	12,949
Old metal	5	5,384
Saddlery	5	1,060
Steel	3,142	37,270
Spelter	110,500	6,224
Silverware	2	211
Tin boxes	28,043	261,272
Tin, 23 1/2 lb. cans	113,240	32,833
Wire	269	7,173
Zinc	34,253	1,664

	1871.	1872.	1873.
For the week	\$3,385,742	\$4,405,445	\$5,420,644
Prev. reported	\$10,975,018	\$12,491,440	\$14,808,583

Since Jan. 1... \$153,330,760 \$147,166,585 \$190,229,227  
Exports of specie.

	1871.	1872.	1873.
Total for the week	\$399,428	\$382,530	\$399,428
Previously reported	\$399,428	\$382,530	\$399,428

Total since January 1, 1873... \$39,234,636  
The government bond market closed steady. We quote:

	Bid.	Asked.
U. S. Currency 6s	113 1/2	113 3/4
U. S. 6s, 1881, reg.	117	117 1/2
U. S. 6s, 1881, c.	117 1/2	117 3/4
U. S. 6s, 5-30 reg. May and Nov	117 1/2	117 3/4
U. S. 6s, 1882, c.	117 1/2	117 3/4
U. S. 5-30 1883, c.	117 1/2	117 3/4
U. S. 5-30 1885, c.	117 1/2	117 3/4
U. S. 1-40 reg.	117 1/2	117 3/4
U. S. 1-40 c.	117 1/2	117 3/4
U. S. 5s, 1881, c.	117 1/2	117 3/4
U. S. 5s, 1881, c.	117 1/2	117 3/4

The following were the highest and lowest prices of stocks to-day:

	Highest.	Lowest.
N. Y. Cen. & Hudson Consolidated	104 1/2	104 1/4
Lake Shore	91	90 1/2
Rock Island	108 1/2	108 1/4
Wabash	70 1/2	70 1/4
Western Union Telegraph	92 1/2	92 1/4
Panama	111 1/2	111 1/4
Pacific Mail	44 1/2	44 1/4
Erie	59 1/2	59 1/4
Ohio & Mississippi	38 1/2	38 1/4
Union Pacific	30 1/2	30 1/4
C. & Ind. Central	31 1/2	31 1/4
Atlantic & Pacific Preferred	26 1/2	26 1/4

## GENERAL HARDWARE.

The daily papers last Thursday had a cable dispatch, giving a synopsis of a leading article in the London Times, the burden of which was that England's supremacy in the manufacture of iron was passing away. This dispatch has been the text of much comment in American newspapers, although it merely gave expression, more forcibly, perhaps, than usual, to what has been for months the feeling of intelligent observers on both sides of the ocean. The Times itself, but a short time ago, spoke as fol-

lows regarding the progress of our American Hardware and Iron industries, both in our own and foreign markets:

Not a little interest and apprehension have been excited in the Hardware district, of which Birmingham is the center, by advice lately handed from New York respecting the wonderful development of the Iron and Hardware industries of the United States. The accuracy of these advices is, indeed, to some extent confirmed by the serious diminution of orders for certain classes of Hardware, the manufacturers of which have hitherto found in the American market their principal customers. Nor does it appear that our rivals in the States are content with satisfying the requirements of their own market, for their productions are already supplanting English goods in Canada, and to some extent in Australia and New Zealand.

In order that this might not be thought an exaggerated view of the case, the Times quoted "a well-informed correspondent" of the Birmingham Post, writing from New York to this effect:

On one point the hardware merchants of New York are all agreed, that the day for the sale of English hardware in the United States has almost departed. In some few special articles, such as pliers, etc., the Germans will probably always be able to under-sell all competitors; some English manufacturers of long-established repute, such as Rogers' cutlery, will also continue to be in demand, but for the rest foreign-made hardware will soon be unknown in this market. Unless some unexpected turn of affairs changes for a while the course of trade, and not only is this country now competent to supply its own needs, but every year it is gradually increasing its exports of hardware to Canada, to the South American States, and to the British Australian colonies. Indeed, it is a very common boast that in a very short time the superiority of Yankee skill and ingenuity will force a market in England itself for many articles of American hardware; that Yankee cutlery will appear on English dinner tables, and that the augers and chisels be preferred by the carpenters of Birmingham and Sheffield.

To this the Times adds:

These statements are to some extent corroborated by the advices now being received by the merchants in Birmingham and Wolverhampton. There can be no doubt that the American manufacturers have turned to profitable account the opportunity afforded by the present course of events in the English labor market. For some years the American manufacturers have had to contend with the disadvantage of dear labor; but this very circumstance has, in the long run, proved a benefit to them, seeing that it has enforced the application of labor-saving machinery on a much larger scale than has been attempted in this country. The superiority of American iron castings has long been acknowledged, and in the earlier years of hardware manufacture in the States, the dearth of labor was largely compensated by the substitution of cast for wrought iron, in almost all classes of produce. The quality of the work, however, obtained at the expense of the quality of the goods for strength and endurance, and the necessity of increased mechanical appliances for the saving of hand labor became apparent. Consequently the leading manufacturers of the States, the wonderful system of labor-saving machinery now existing in the result. Railway fastenings, door locks, spring bars, curry combs, tin wares, and some descriptions of edge tools are among the classes of produce in which American competition is beginning to be seriously felt in Birmingham and the South Staffordshire district. Last year's produce of iron rolls in the States was nearly 1,000,000 tons, of which Pennsylvania alone yielded nearly one-half. Other descriptions of finished iron are also being produced in large and rapidly increasing quantities, and at the present rate of progress the shipment of iron from England across the Atlantic will soon become a thing of the past.

As confirmation of this, to some extent, the following sentence from Macomber, Bigelow & Dowse's Boston report, in this issue of The Iron Age, is interesting:

Exports of Hardware to South America and Sandwich Islands, also to the Provinces, being beyond the usual demand, show that we can compete advantageously with England. We have only to make American goods known more to create an extensive business in foreign markets.

Trade is active, but the amount of goods sold does not seem so large as it was a few days ago, the demand now coming from a smaller class of buyers. Present indications point to a moderate and healthful fall trade. Every one seems careful not to buy more goods than he needs. The feeling prevails that while prices are not likely to decline materially, there is little likelihood of serious advances, so that there is no temptation to speculate.

In foreign Hardware, trade is fairly active, although business has fallen off as compared with the previous week. We notice a brisk demand from the interior for Peter Wright's Anvils, the stocks of which are being rapidly reduced, and holders are consequently firm in their views on our quotations. There is no change to notice in prices. Some goods have been shaded through the anxiety of weak holders to make sales, while Coil Chain and Traces are more firmly held at the figures quoted, owing to recent advices. A cable despatch to Alfred Field & Co., received since our last issue, gives notice of a further advance of a half-penny on Traces, 6 1/2-10-2 being now quoted in Birmingham at 1 1/4.

We omit our usual quotation of German Hammer and Coil Chain, as any figure we might quote, under existing circumstances, would at best be nominal. 20 @ 25 per cent. discount is generally considered the fair market value of these goods, but it is proper to state that these figures can be shaded considerably with little difficulty. Butcher's Files are in fair demand, and holders are firm at 55-50 to £, gold. Good-lad's Files, of which there is a good stock in this market, are offered at \$4 to £, gold.

There is no change to report in the condition of the Nail market. The Eastern Mills resumed operations on Monday last, and the demand, although not noticeably brisk, continues fair. Although it is freely asserted that the manufacturers are losing money on sales made on a basis of \$4-50, net, for 10d, still there is no difficulty in placing orders for small lots at that figure, but we hear of no lower price for larger lots; on the contrary, manufacturers as a rule are reluctant to book large orders, and decline with firmness the acceptance of contracts for future delivery at these rates.

Trade in Stamped and Japanned Tin Ware is brisk, and some goods are offered at prices scarcely remunerative. Japanned Dust Pans are freely offered at \$18-50 per gross in small lots, and we understand that this figure would be shaded for a large order. We quote 9 inch Pie Plates at \$6, 2 quart Bucket Covers at \$3-25, 6 quart Bucket Covers at \$5-40 per gross net, and plain Stamped Milk Pans at the following prices net:

	4.	6.	10 quarts.
820-25	\$24-50	\$24-50	\$42-00 per gross.

Since the break in the combination it is difficult to say what the bottom figure would be for a large line of Retinned Milk Pans. The best rates we have heard for actual transactions is discount 30 per cent. Box Graters are offered at \$3-20 per gross, net.

The Trenton Lock Co., of which F. & L. Many & Marshall are the agents, have prepared, and will shortly issue, a handsome illustrated catalogue of their manufactures. The following is their new revised price list, dated the 1st inst.:

No.	Page of Catalogue.	Price. Per Doz.	No.	Page of Catalogue.	Price. Per Doz.
21	6	\$3-20	850	46	2-00
21 1/2	7	3-50	855	46	1-50
22	6	4-00	855	48	1-50
23 1/2	7	4-30			
25	8	3-50			
25 1/2	9	3-75			
27 1/2	9	4-75			
36	29	13-50			
107	10	6-25			
107 1/2	11	6-38			
109	10	4-75			
109 1/2	11	4-88			
111	10	4-00			
111 1/2	11	4-12			
113	12	4-12			
113 1/2	13	4-25			
115	12	5-12			
115 1/2	13	5-25			
117	12	6-38			
117 1/2	13	6-50			
119	14	6-75			
121	14	6-50			
123	14	8-00			
123 1/2	15	8-00			
125	15	12-00			
125 1/2	16	12-00			
127	15	14-50			
127 1/2	16	14-50			
129	16	16-50			
131	16	22-00			
131 1/2	17	22-00			
133	16	25-00			
133 1/2	17	25-00			
135	17	28-00			
135 1/2	18	28-00			
137	17	30-00			
137 1/2	18	30-00			
139	18	32-00			
139 1/2	19	32-00			
141	18	34-00			
141 1/2	19	34-00			
143	19	36-00			
143 1/2	20	36-00			
145	19	38-00			
145 1/2	20	38-00			
147	20	40-00			
147 1/2	21	40-00			
149	20	42-00			
149 1/2	21	42-00			
151	21	44-00			
151 1/2	22	44-00			
153	21	46-00			
153 1/2	22	46-00			
155	22	48-00			
155 1/2	23	48-00			
157	22	50-00			
157 1/2	23	50-00			
159	23	52-00			
159 1/2	24	52-00			
161	23	54-00			
161 1/2	24	54-00			
163	24	56-00			
163 1/2	25	56-00			
165	24	58-00			
165 1/2	25	58-00			
167	25	60-00			
167 1/2	26	60-00			
169	25	62-00			
169 1/2	26	62-00			
171	26	64-00			
171 1/2	27	64-00			
173	26	66-00			
173 1/2	27	66-00			
175	27	68-00			
175 1/2	28	68-00			
177	27	70-00			
177 1/2	28	70-00			
179	28	72-00			
179 1/2	29	72-00			
181	28	74-00			
181 1/2	29	74-00			
183	28	76-00			
183 1/2	29	76-00			
185	29	78-00			
185 1/2	30	78-00			
187	29	80-00			
187 1/2	30	80-00			
189	29	82-00			
189 1/2	30	82-00			
191	30	84-00			
191 1/2	31	84-00			
193	30	86-00			
193 1/2	31	86-00			
195	31	88-00			
195 1/2	32	88-00			
197	31	90-00			
197 1/2	32	90-00			
199	32	92-00			
199 1/2	33	92-00			
201	32	94-00			
201 1/2	33	94-00			
203	33	96-00			
203 1/2	34	96-00			
205	33	98-00			
205 1/2	34	98-00			
207	34	100-00			
207 1/2	35	100-00			

Keys Class.

181	16	22 00	3	48	0 50
183	16	25 00	4	49	0 50
185	16	28 00	5	48	0 50
2120	23	5 00	6	49	1 10
2140	23	5 00	7	48	1 20
2112	34	5 00	8	49	1 10
2114	34	6 50	9	48	1 38
2116	34	8 25	10	1 25	
2118	34	7 25	11	48	2 00
2200	24	10 00	12	49	3 00
2220	25	9 00	13	48	2 50
2242	25	7 00	14	49	2 25
226	25	10 00	15	48	1 50
228	25	8 00	16	49	1 75
230	25	11 50	17	48	1 50
240	26	14 00	18	49	1 50



(From our Regular Correspondent.)

SHEFFIELD, Eng., August 18, 1873.

I have this week to record the undoubted fact that there is a slight improvement in the general condition of the British iron trade. This amendment is not as yet very marked.



## THE ARCTIC FREEZER.

SIMPLEST.



QUICKEST.

BEST.

Send for Price List.

**E. S. & J. TORREY,**

166 Fulton Street, New York,

**J. D. FARRINGTON, Jr.,**

38 Murray Street, New York.

MANUFACTURER OF

**Japanned, Plain and Stamped Tin Ware,**THE PATENT SELF-RIGHTING  
CUSPADORE**J. D. FARRINGTON, Jr.,**  
SOLE MANUFACTURER.

Price List of Self-Righting Cuspadores:

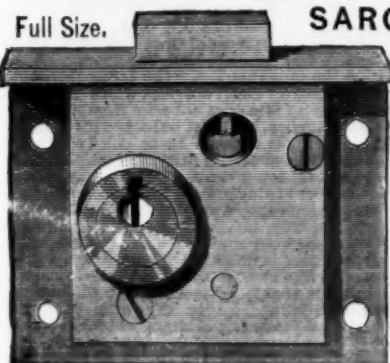
Class A, Seven Patterns	\$15 00 per dozen.
" B, Eight "	18 00 "
" C, Eight "	21 00 "
" D, Eleven "	24 00 "
Nickel Plated, No. 1	48 00 "
" " No. 2 (small)	42 00 "

THE CORRUGATED STOVE PIPE ELBOW,  
Strong, Durable,  
Cheap.

No Soot,  
Better Draft.**SELLEW ELBOW CO.,**

48 Cliff Street, NEW YORK.

27 North Canal Street. CHICAGO.

**SARGENT & GREENLEAF'S**

Celebrated

**UNPICKABLE LOCKS.**

Drawer, Trunk,

HOUSE AND STORE DOOR LOCKS,

**PAD LOCKS,**

Night Latches, Etc.,

WITH FLAT GERMAN SILVER KEYS.

Combination Bank and Safe Locks.

Also the

**Patent Adjustable Elbow.**

For Stove, Furnace, Conductor, and all other Sheet Metal Pipes, With Universal Adjustable Joints.

Can be changed at will to any desired angle. Its advantages over all other Elbows are at once apparent.

For Beauty, Strength and Durability it is Unequaled.

Manufactured by

**Sargent, Greenleaf & Cole,**

P. O. Box 4598.

300 Broadway, N. Y.

Send for Catalogue and Price Lists.

**Fire Brick.****B. KREISCHER & SON.,**  
New York Fire Brick &  
STATEN ISLAND  
CLAY RETORT WORKS,

Established 1845.

Office, 58 Goerck Street, cor. Delancy Street,  
East River, New York.The largest stock of Fire Brick of all shapes and  
sizes on hand, and made to order at short notice.Cupola Brick, for McKenzie Patent,  
and others. Fire Mortar, Ground Brick, Clay and  
Sand. Superior Kaolin for Rolling Mills and Foundries.  
Stone Ware and other Fire Clay and Sand,  
from my own mines at New Jersey and Staten Island,  
by the cargo or otherwise.**Philadelphia Fire Brick**

AND

**Clay Retort Works,**  
AND KENSINGTON FIRE BRICK WORKS.

Office, 23d and Vine, Philadelphia.

**PHILIP NEWKUMET,**Successors to **JOHN NEWKUMET**, Proprietor  
manufactures 9-inch Fire Bricks, Tiles, and Blocks,  
for Rolling Mills, Blast Furnaces, Foundries, Gas  
Works, Lime Kilns, Glass Houses, &c., &c.Articles of every description made to order at  
short notice, and in a very superior manner.

"CLAY RETORTS FOR SUGAR HOUSES."

**A. HALL & SONS,** Perth Amboy, N. J.

ESTABLISHED 1846.

**HALL & SONS,** Buffalo, N. Y.

ESTABLISHED 1866.

**FIRE BRICK**of reliable quality for all purposes, manufactured by the  
best New Jersey Fire Bricks. Also, MISCELLANEOUS  
ROCKINGHAM WARE, Fire Clay, Fire Sand, Kaolin  
and Ground Fire Brick.

BLACK LEAD

**CRUCIBLES.**

Manufactured by

**ADAM NEWKUMET,**

1537 &amp; 1539 N. Front St., Phila., Pa.,

For Steel, Brass, Nickel, Copper, Bronze, &amp;c.

Equal to any in the market, and all guaranteed.

Keeping a full stock of all sizes on hand, and  
being confident of giving entire satisfaction, we re-  
spectfully ask consumers to give us a trial.**Watson Fire Brick Manufactory,**

ESTABLISHED 1836.

**JOHN R. WATSON,** Perth Amboy New Jersey,

Manufacturer of

**FIRE BRICK,**

For Rolling Mills, Blast Furnaces, Foundries,

Gas Works, Lime Kilns, Tanneries, Boiler

and Grate Setting, Glass Works, &amp;c.

FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

**Salamander & Albany Fire Brick Works**

Rathbone St., Albany, New York.

**PALMER, NEWTON & CO.,**

Manufacturers of FIRE BRICK of every shape

for Gas Works, Tanneries, Lime &amp; Kilns, Rolling Mills,

Blast Furnaces, Glass Works, Stoves, Ranges and Heater

Lining: Fire Clays, Kaolin, Fire Sand, Fire Cement,

by cargo or barrel. Orders filled on short notice.

**Brick Presses,****BRICK PRESSES,**

For Fire and Red Brick.

**PATENT STEAM GEARING**

For grinding Clay for Red or Fire Brick, and all

kinds of Brick Machines in general.

Works, 1819 Germantown Ave., Phila.

**GEO. CARNELL.**

Oldest and Largest Establishment of the kind in the U.S.

**F. L. & D. R. CARNELL,**

1844 Germantown Avenue, Philadelphia.

Manufacturers of Pennsylvania Brick Machine,

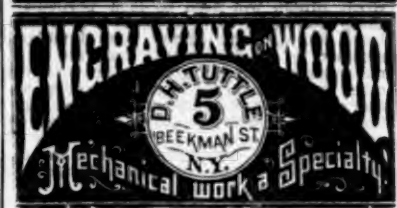
Little Giant Pipe Machine, Fire and Red Brick

Presses, Clay Wheels, Tile Machines, Stampers,

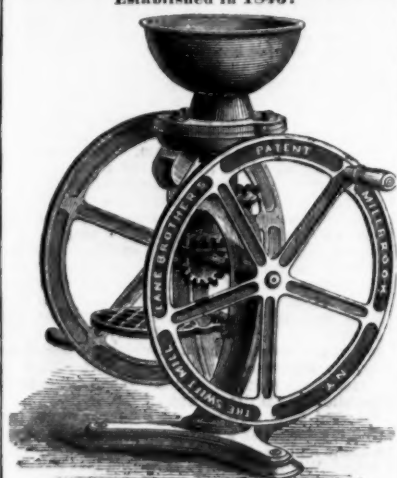
Grinding Pans. Brick Yards fitted out for running

by steam or horse. Heavy and Light Castings. Send

for circular.

**The Swift Mill.**

Established in 1845.

Letter "B" Geared Counter Coffee  
or Spice Mill.

Stands nearly 2 1/2 feet high. Is highly finished, colors

deep Vermilion and Gold. We make more than 20 dif-

ferent styles and sizes.

Send for catalogue. Manufactured exclusively by

**LANE BROTHERS, Millbrook, N. Y.**Four Sizes. Coal or Wood  
Shaking and Dumping Grate,  
and Swing Top.**WM. RESOR & CO., Cincinnati,**  
Manufacturers of the renowned Cooking Stoves, FASHION, for wood, and MONITOR, for coal  
and wood, and the greatest variety of Coal and Wood Heating and Cooking Stoves. A large stock  
constantly on hand, and all orders filled promptly. (Send for Catalogue and Price List.)**SWISS**

Made from pure

Very Musical.

One of these Bells  
ordinary Hand Bell can  
is more pleasing toThis cut represents  
smallest Bell, and are  
Silver Plated or Nickel

Send for

**TAYLOR**

NEW BRITAIN,

**BELL,**

SWISS METAL.

Very Pretty.

half the size of an or-  
be heard further, and  
the ear.the full size of the  
made either Polished,  
Plated.

Price List.

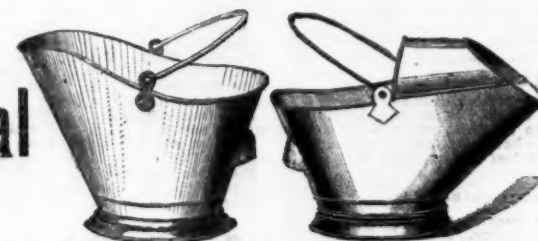
**MFG. CO.**

CONNECTICUT,



Exclusive

Manufacturers.

**Coal Hods.**

STAMPED CORRUGATED RIVETED BOTTOM IN SIX STYLES.

**SMITH, BURNS & CO.,**

Manufacturers of

Galvanized and Japanned Sheet Iron Goods and Tin Ware, Fry Pans, Broilers, Ash Cans,  
Garbage Buckets, Chamber Pails, Tea Kettles, Wash Boilers, Water Pails, Well Buckets,  
Toilet Ware, &c., &c. Exclusive manufacturers of the Patent Combined Chamber and Commode  
Pail, Stamped and Planished Ware.

Warehouse, 46 Cliff Street, between Beekman and Fulton Streets, NEW YORK.



# WILSON MANUFACTURING COMPANY., NEW LONDON, CONN.

## SOLID BOX VISES.

With or without Convex and Concave Washers.  
Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp Heads and Screws, Parallel Bench Vises, Sash Pullies, Ho House Pullies, Composition Cocks, Bench Screws, Vise Screws, Gridirons, Drill Stocks and Boxes, Box Chisels, Rivets, Sheaves, Block Pins, Composition Roller and Iron Bushings, Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying Pins, Marlin Spikes, Malleable Iron Castings, and General Hardware.

GALVANIZING DONE TO ORDER.  
WILSON MFG. COMPANY,  
Warehouse 37 Chambers St., N. Y.

## EMMET HAMMER CO.,

Manufacturers of all kinds of  
HAMMERS AND SLEDGES AND CONTRACTORS TOOLS,  
BROOKLYN, E. D., NEW YORK.



## St. Louis Malleable Iron Works.

No. 2106 Market Street,

**HENRY M. FILLEY,**

MANUFACTURER OF

Malleable and Light Gray Castings,  
AND GENERAL HARDWARE.

Special attention paid to Jobbing and General Pattern Work.

## WEST POINT FOUNDRY,

Established 1817. COLD SPRING, N. Y.

## Paulding, Kemble & Company,

Office 30 Broadway, New York; Works at Cold Spring, Putnam Co., N. Y.

Steam Engines, Boilers & Heavy Machinery of all kinds, and Heavy Forgings.

FORD'S PATENT STOVE, for heating Air for Blast Furnaces.

Hornig's Patent Shearing and Punching Machines,

NAPIER'S PAT. DIFFERENTIAL CLUTCH, for starting and reversing Heavy Machinery.

Hepworth's Patent Centrifugal Machines.

Castings from Gun Metal, guaranteed 30,000 pounds per square inch.

## GIVEN AWAY.

## A Fine German Chromo.

We send an elegant Chromo, mounted and ready for framing, free to every Agent for

# UNDERGROUND;

or, Life Below the Surface.

BY THOS. W. KNOX.

942 PAGES OCTAVO.

130 FINE ENGRAVINGS.

Relates Incidents and Accidents beyond the Light of Day; Startling Adventures in all parts of the World; Mines and Mode of Working them; Under-currents of Society; Gambling and its Horrors; Caverns and their Mysteries; The Dark ways of Wickedness; Prisons and their Secrets; Down in the Depths of the Sea; Strange Stories of the Detection of Crime.

The book treats of experience with brigands; nights in opium dens and gambling hells; life in prison; stories of exiles; adventures among Indians; journeys through sewers and catacombs; accidents in mines; pirates and piracy; tortures of the Inquisition; wonderful burglaries; underworld of the great cities, etc., etc.

## AGENTS WANTED

for this work. Exclusive territory given. Agents can make \$100 a week in selling this book. Send for circulars and terms to agents.

J. B. BURR & HYDE, Hartford, Conn., or Chicago, Ill.

## A HOME COMFORT.

## Brooks' Patent Stove Board.

Letters Patent from the United States and Canada.



This really genuine improvement in Stove Boards is illustrated by the cuts; the round one being a top view of the zinc surface, polished and neatly beaded around the edge, and the oblong one shows the under side of paper, and between that and the zinc a layer of sheet iron, which effectually protects it from being injured by the stove legs, or otherwise; and also stiffens it to lay very flat, and is a necessity to support the ornamentation.

The parts are held together by turning the edge of the zinc like a hem around the under side. They are equally desirable for Parlor or Cooking Stoves, are very compact to ship, are as cheap as plain zinc, when their durability is considered, and are the most appropriate article in market for their purpose.

21 Sizes, Round, Square and Oblong. Prices and Circulars supplied upon application. Address the manufacturers.

SIDNEY SHEPARD & CO., Buffalo, N. Y.

AGENTS.—VAN WART & McCOY, 43 Chambers Street, N. Y.; SHEPHERD & LLOYD, 405 Commerce Street, Philadelphia. Sold by FERRY & CO., 26 Beekman St., N. Y.



## TO THE HARDWARE TRADE.

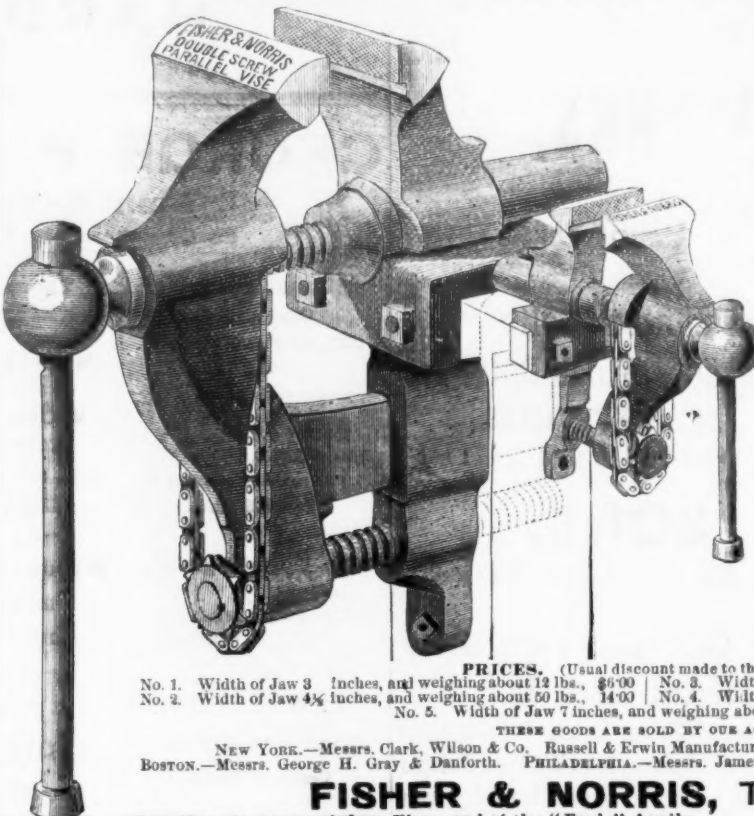
The great popularity of the **HARBER BIT BRACE**, and the firm prices at which they are held, have induced several manufacturers to infringe our patents, and offer an inferior article at a less price. As to the infringement, we shall at present only trouble the manufacturers. As to cheaper goods at a lower price, we say to our customers, if you really want them we can make them of any desired quality and price. But up to the present time we have steadily improved our goods and have sold them as low as such goods could be afforded. The actual cost of our braces is at least 20 per cent. more than those which are offered in the market at 5 per cent. less than ours. At present we are able to hold most of our trade, and we shall continue to improve our goods and sell at reasonable rates, while the hardware trade continues to support us in so doing.

## MILLERS FALLS CO.,

78 Beekman Street, New York.

ALSO MANUFACTURE PARALLEL VISES AND DRILLING MACHINES.

# THE DOUBLE SCREW PARALLEL VISE.



More than twenty-five years' use of this Vise by Machinists, Tool Makers, Locomotive Shops, &c., has established its superiority over every other.

It is the only one which has all the strength and "grip" of the ordinary English Vise; and at the same time with the jaws parallel at every point of opening.

In all other "Parallel" Vises using only one screw, less than one-third of the power applied is effective on the work itself; beside, in those vises the large waste of power on the slide from friction and the tendency to "jam," of the lower end of the jaw, if screwed up very hard, renders them unfit for heavy work.

In this vise the jaws are kept *always* parallel by the lower screw moving in or out exactly with the upper, lever screw, by means of the chain connecting both; also, by their relative position two-thirds of the power applied at the lever screw is received by any piece held between the jaws—thus enabling the heaviest work ever required of a vise to be done with this.

The Screws are forged of the best refined iron, and work in solid cut thread boxes. The Jaws are faced with best Tool Steel, welded on, file cut, and properly tempered for wear.

The Chain is very carefully made of case hardened inside links and rivets, and, acting only to regulate the position of the lower screw for different points of opening, has no direct strain of the work upon it; it is therefore as durable as the other parts.

Only the strongest material is used in this manufacture and from actual experiment on the six inch jaw vise which has screws of 1 1/2 inch diameter and lever 19 inches long, it has been found that applied at the lever screw, it required to break either of the jaws, *drawn and one-half* tons, thus exhibiting a maximum strength far above any other vise of like size.

PRICES. (Usual discount made to the Trade.)  
No. 1. Width of Jaw 3 inches, and weighing about 12 lbs., \$6.00 | No. 3. Width of Jaw 5 inches, and weighing about 80 lbs., \$18.00  
No. 2. Width of Jaw 4 1/2 inches, and weighing about 50 lbs., 14.00 | No. 4. Width of Jaw 6 inches, and weighing about 135 lbs., 34.00  
No. 5. Width of Jaw 7 inches, and weighing about 160 lbs., \$30.00.

THESE GOODS ARE SOLD BY OUR AGENTS IN

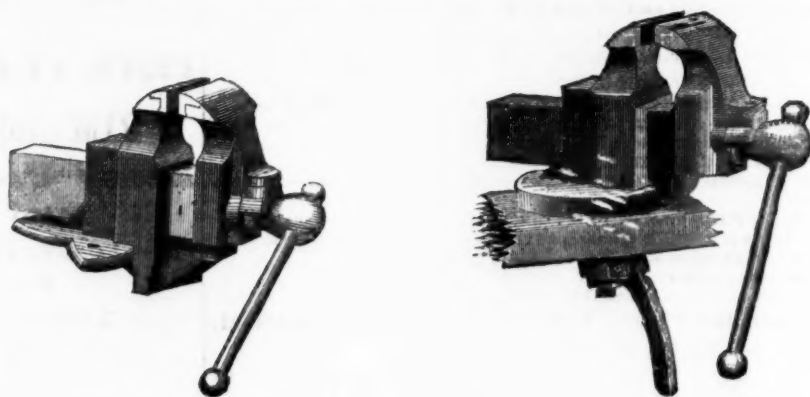
NEW YORK.—Messrs. Clark, Wilson & Co. Russell & Erwin Manufacturing Company. Messrs. Durrie & Rusher.  
BOSTON.—Messrs. George H. Gray & Danforth. PHILADELPHIA.—Messrs. James C. Hand & Co. BALTIMORE.—Mr. W. H. Cole.

## FISHER & NORRIS, Trenton, N. J.,

Sole Manufacturers of these Vises, and of the "Eagle" Anvils.

## HOWARD

# PARALLEL BENCH VISE.



Manufactured at the

## HOWARD IRON WORKS,

Buffalo, N. Y.

## RUSSELL & ERWIN MANUFACTURING CO.,

New York and Philadelphia, Agents.

## MINOT & CO., Oliver Street, Boston,

Selling Agents Lowell Wrench Co.'s

# TRIPLE ACTING RATCHET DRILL, the Simplest, Cheapest and Best.

MANUFACTURERS OF  
**HAMMERS,**  
Sledges,  
**BLACKSMITHS'**

AND  
Stone Masons'  
**TOOLS,**

Bush Hammers,

etc., etc.]



AGENTS FOR  
Washoe Picks,  
Western Files,  
Sweet's Crow Bars,  
N. Carolina Handles,  
Steel Foundry Riddles  
Beaver Falls Cutlery  
etc., etc.

Send for Price Lists and Discounts.



## Hardware.

**ROY & COMPANY,**

West Troy, N. Y.,

Manufacturers of

Wrought Iron Butts, Strap and T Hinges,  
 PLATE AND HOOK HINGES,  
 Cold Pressed Nuts and Washers, Felloe Clips, &c  
 JOHN L. FISHER, Agent, 116 Duane Street, New York.

**SPEAR & JACKSON**

Sheffield, England,

MANUFACTURERS OF

Saws, Files, Edge Tools and Steel  
 JOHN L. FISHER, Agent,  
 116 Duane Street, NEW YORK.

**STANLEY WORKS,**

MANUFACTURERS OF

Wrought Butts, Strap and T Hinges.  
 Bronzed Butts and Bolts.  
 Wrought Barrel, Square and Shutter Bolts.  
 Wrought Chest Handles, Washers, Flush Bolts, &c  
**79 CHAMBERS ST., NEW YORK.**  
 Factory at New Britain, CONNECTICUT.

**HILGER & SONS,**

87 Chambers and 69 Reade Streets, NEW YORK

MANUFACTURERS AND IMPORTERS OF

German Hardware, Cutlery, Scissors, Coffin Lace, Sheep Shears  
 Ball Braces, Bright Halter and Coil Chains, &c.

Also, Birmingham and Sheffield Hardware and Chains, Butcher's Files, Edge  
 Tools & Razors, Wostenholm's Razors & Farriers' Knives, John Wilson's Butcher  
 Knives and Steels, Stub's Tapers, Chesterman's Metallic Tapes, Isaac Greave's  
 Hedge Shears, James Bees & Parkin's Spoke Shaves, Turn Screws and Braces,  
 Pad Locks, Goulcher's Gun Locks, Brades Trowels, &c.

**HERMANN BOKER & CO.,**

OFFICES AND WAREHOUSES:

NEW YORK, 101 and 103 Duane and 91 and 93 Thomas Streets.

RENSSELAIR and SOLINGEN (Prussia.) H. BOKER &amp; Co.

SHEFFIELD (England), No. 3 Arundal Lane, Represented by Mr. ARTHUR LEE.

LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers of Cutlery, Guns, Hardware and Railroad Material.  
 Proprietors of TRENTON VISE AND TOOL WORKS, Trenton, N. J.—Vises, Picks,  
 Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.  
 Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.  
 Sole Agents for LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cut-  
 lery and Butcher Knives.

W. & S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.  
 Geo. Wostenholm & Son's Knives, Scissors and Razors, the largest stock in the U. S.  
 John Wilson's Butcher and Shoe Knives.  
 Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of  
 German and English Hardware, Cutlery, Guns, Gun Material,  
 Chains, Heavy Goods.

**JOHN WILSON'S CELEBRATED**

BUTCHERS' KNIVES,  
 BUTCHERS' STEELS,  
 AND  
 SHOE KNIVES.

THE TRADE MARK, IN ADDITION  
 TO THE NAME,  
 IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY  
**JOHN WILSON.**

GRANTED A.D. 1766, BY THE  
 CORPORATION OF CUTLERS OF SHEFFIELD,  
 AND PROTECTED BY ACT OF PARLIAMENT.

Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750.

**BEAM & MURRAY,**

IMPORTERS OF

Anvils, Chains, Pocket Cutlery,  
 Guns, Files,  
 BIRMINGHAM, SHEFFIELD & GERMAN HARDWARE,  
 Wostenholm's IXL Pocket Knives & Razors, Butcher's Files, Tools, &c.  
 No. 54 Cliff Street. NEW YORK.

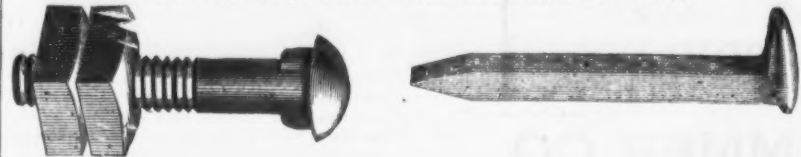
## Hardware.

**PRATT & CO.,**  
BUFFALO IRON and NAIL WORKS, Buffalo, N. Y.

Branch Office, 55 Chambers Street, New York.

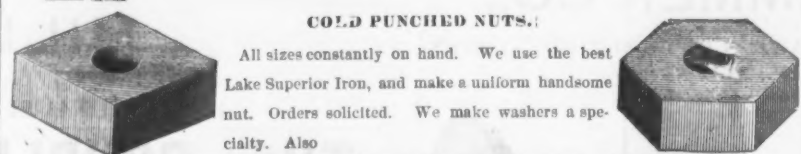
Manufacture Bar, Angle, and Plate Iron, Spikes and Nails, Railroad Fish Plates, Bolt  
and Spikes, Railroad and Contractors' Supplies in general, Bolt Blanks, Conch Screws  
"Adams Nut Lock."

Plates Punched and Cut Hot. Bolts and Spikes, Superior Stock



COLD PUNCHED NUTS.

All sizes constantly on hand. We use the best  
 Lake Superior Iron, and make a uniform handsome  
 nut. Orders solicited. We make washers a spe-  
 cialty. Also



Wholesale Dealers in and Manufacturers of every description of

**HEAVY AND SHELF  
HARDWARE.**

PRATT &amp; CO., Buffalo, N. Y.

**GEORGE B. WALBRIDGE,**

Manufacturers' Agent,

55 Chambers St., New York, Represents:

National Horse Nail  
 Company,  
 POLISHED AND POINTED  
 NAILS.

Shoenberger's  
 HAMMERED  
 HORSE SHOES.

PRATT & CO.,  
 BUFFALO HORSE NAILS,  
 NUTS, WASHERS,  
 Crow Bars, &c.

SHELTON CO.,  
 BED SCREWS,  
 CARRIAGE BOLTS,  
 TACKS, &c.

WOOLWORTH  
 HANDLE WORKS,  
 Axe, Pick and Sledge  
 HANDLES.

D. H. GOODELL,  
 Lightning & Turn Table  
 APPLE PARERS.

Ten Eyck Mfg. Co.,  
 SLEDGES,  
 GRUB HOES,  
 HATCHETS, &c.

Woods Cutlery Co.,  
 Hot Water Proof  
 TABLE CUTLERY.

ELEPHANT  
 AXES,  
 HATCHETS,  
 EDGE TOOLS.

ALWAYS COOL  
 STOVE LID LIFTERS,  
 Ventilated Handles.

National  
 STOVE POLISH  
 Company.

CHALLENGE  
 AUGERS and BITS,  
 Croton Falls Manuf'g Co.

**YALE LOCK MFG. CO.**

Office and Works  
 at  
 STAMFORD,  
 CONN.



Salesroom  
 No. 298 Broadway,  
 New York.

FINE FLAT-KEYED LOCKS for all Purposes.

RIM and MORTISE STORE DOOR LOCKS,  
 Heavy Front Door and Vestibule Locks.

Rim and Mortise Night Latches,  
 CLOSET, CHEST, DRAWER, DESK and PADLOCKS,

Post Office Lock Boxes and Prison Locks,  
 Leeds' Gate Fixtures, Field's Shutter Bars, etc., etc.

The Yale Lock Manufacturing Co.,  
STAMFORD, CONN.

The Best  
 TUMBLER  
 LOCK  
 Ever Made.



Samples sent  
 on  
 Application

New Pattern Key,  
 No. 500 Yale Lock.

**Ludlow Valve Mfg. Co.,**

OFFICE AND WORKS:

938 to 954 River St. &amp; 67 to 83 Vail Ave., Troy, N. Y.,

MAKE

**VALVES**

(Double and Single Gate, 1/4 in. to 36 in.—outside and inside Screws, Indicator, &c.)  
 for Gas, Water and Steam.



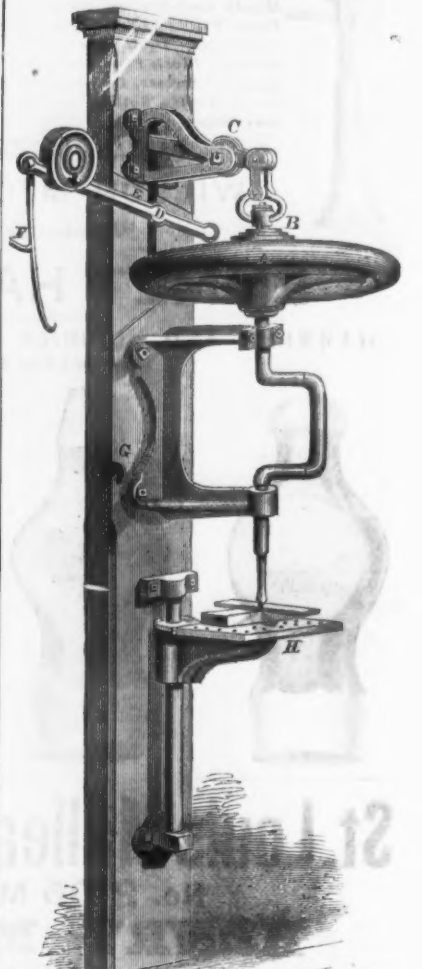
Price: Japanned No. 6, \$5; Coppered No. 6, \$6; Silvered No. 6, \$8.

Liberal discount to the trade. All springs warranted to be of the best Steel Wire.

Depots: HYATT & SPENCER, 54 Beekman St., N. Y. SIDNEY SHEPARD &  
 CO., 65 Main St., Buffalo, N. Y. PALMER & GRAY, 225 Elm St.,  
 Cincinnati, Ohio. Factory, Indianapolis, Ind.

## Hardware.

**BIDDLE MFG. CO.,**  
 102 Chambers Street, N. Y.,  
 Fine Tools & Hardware Specialties  
 IMPROVED DRILL PRESSES,  
 SHEARS & PUNCHES.



Patent Self Feed Hand Drill, Price, \$40 00  
 Patent Self Feed Power Drill, Single Speed, Counter  
 Shaft and Pulleys complete, Price, \$5 00  
 Patent Self Feed Power Drill, Three Speeds,  
 Counter Shaft and Pulleys complete, Price, \$10 00  
 Send for Illustrated Catalogue and Price List.  
 Sole agents for the Pacific Coast,  
 CONROY, O'CONNOR & Co., SAN FRANCISCO, CAL.

**THE  
Peck, Stow & Wilcox Co.,**

MANUFACTURERS OF

**TINNERS'**

Tools and Machines,

AND

**GENERAL HARDWARE**

97 Chambers Street, New York.



FRANKLIN S. MILES,  
 Manufacturer of  
 Brass, Iron, Steel and German Silver  
 SCREWS,  
 205 Quarry Street, Philadelphia.

**H. CARTER & SON,**  
 290 PEARL ST., NEW YORK.



Manufacturers of and Dealers in all descriptions of  
 Moulders' and Plasterers' Tools, and Dealers in  
 General Hardware, Gilded Copper Weather Vanes,  
 CARTER'S PATENT CARRIAGE LIFTING JACK, &c.



# New York Wholesale Prices, September 3, 1873.

## HARDWARE.

<b>Anvils.</b>	
Solid Cast Steel.	140
Wright's.	120
Armstrong's Horse Mole.	120
Wilkinson's.	120
Eagle Anvil Co. & Co.	120
<b>Apple Parers.</b>	
Turn Table.	8.50
Lighting.	9.00
Reading.	9.00
Union.	15.00
Ray State, Paring, Cutting and Slicing.	9.00
Skeleton.	9.00
Climax Slicer.	11.00
Ray State's Patent.	11.00
Lighting.	11.00
Peach Stoner and Grater.	11.00
<b>Augers and Bits.</b>	
Snell Mfg. Co.	15.00
Russell Jennings.	15.00
Douglas Mfg. Co. Extra.	15.00
No. 1.	15.00
Chapman's Expanding Hollow Auger.	15.00
Ives.	15.00
Expansive Augers.	15.00
Bits.	15.00
Andrews' Bits.	15.00
Cook's Patent.	15.00
Shepardson's Double Cut Bits.	15.00
Griewood's Patent.	15.00
Cast Steel Cut Augers.	15.00
Auger Bits.	15.00
Long Augers.	15.00
Bonney's Patent Hollow.	15.00
Stearns.	15.00
Morse's Bit Stock Drill.	15.00
<b>Axes.</b>	
Blond.	12.50
Hunt's.	12.50
Collins.	12.50
Hurd's.	12.50
Schwitzer Mfg. Co.	12.50
Simmons.	12.50
Morris.	12.50
Red Jacket.	12.50
Mann's.	12.50
Powell Tool Co. "Peerless".	12.50
<b>Balances.</b>	
Chaffin's.	15.00
Fraser's.	15.00
<b>Bands.</b>	
Iron.	15.00
Brass (Plated list).	15.00
<b>Bells.</b>	
Hand, Light Brass.	15.00
White Metal.	15.00
Globe.	15.00
Swiss Hand.	15.00
Abbe's.	15.00
Taylor's Patent.	15.00
Western Gong.	15.00
Brook's Crank.	15.00
Hart Mfg. Co. Crank and Pull.	15.00
Cow-Common Wrought.	15.00
Western.	15.00
Kentucky "Star".	15.00
Dodge's Genuine Kentucky.	15.00
Yan's Genuine.	15.00
<b>Bellows.</b>	
Blacksmiths.	15.00
Van Sand's.	15.00
Washburn's.	15.00
Merriman's.	15.00
<b>Blind Fasteners.</b>	
Boardman's Patent.	15.00
<b>Bolts.</b>	
Cast Iron Barrel, Shutter, &c.	15.00
Wrought Iron Barrel.	15.00
Carriage and Tire.	15.00
Star, Philadelphia.	15.00
Eagle, Philadelphia.	15.00
Philadelphia Pattern, F. & W.	15.00
Carriage and Tire, R. B. & W.	15.00
Stove, R. B. & W.	15.00
Union Nut Co.	15.00
Machine.	15.00
<b>Boring Machines.</b>	
Kelly's.	15.00
Snell Mfg. Co. Regular.	15.00
Douglas Mfg. Co. Regular.	15.00
Mortising Machines, each.	15.00
<b>Braces.</b>	
Bayley's Patent.	15.00
Wilson Mfg. Co.	15.00
Spofford's Patent.	15.00
Noble's Patent.	15.00
Bartholomew's Patent Grip.	15.00
<b>Burg Hole Borers.</b>	
Common and Hand.	15.00
Enterprise Mfg. Co.	15.00
Ives' Tap Borer.	15.00
<b>Butcher's Forks.</b>	
Bradley's.	15.00
Beatty's.	15.00
<b>Butts.</b>	
Wrought Brass.	15.00
Cast Lead Joint, Narrow.	15.00
Cast Lead Joint, Broad.	15.00
Cast Lead Joint, Parallelogram.	15.00
Loose Pin.	15.00
Wrought Flat Joint, Narrow.	15.00
Wrought Broad.	15.00
Wrought Table and Back Flaps.	15.00
Cast Butts, Ohio Butt Co.	15.00
Narrow Fast, Drilled and Wire Jointed (old list).	15.00
Broad Fast, Drilled and Wire Jointed.	15.00
Silver Tipped.	15.00
Loose Joint, Japanese.	15.00
Loose Joint, American and Silver Tipped.	15.00
Palmer Blind Butts.	15.00
Nicholson Blind Butts.	15.00
Farmer's Blind Butts.	15.00
A. S. Parker's.	15.00
Clark's Blind Butts.	15.00
Clark's Blind Hinges.	15.00
Seymour's.	15.00
Standard.	15.00
Union Mfg. Co.'s Drilled Fast.	15.00
<b>Caps-Percussion, per 1000.</b>	
E. D. & Co.	15.00
Double Waterproof, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.0, 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 7.9, 8.0, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 11.0, 11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8, 11.9, 12.0, 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8, 12.9, 13.0, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9, 14.0, 14.1, 14.2, 14.3, 14.4, 14.5, 14.6, 14.7, 14.8, 14.9, 15.0, 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 16.0, 16.1, 16.2, 16.3, 16.4, 16.5, 16.6, 16.7, 16.8, 16.9, 17.0, 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9, 18.0, 18.1, 18.2, 18.3, 18.4, 18.5, 18.6, 18.7, 18.8, 18.9, 19.0, 19.1, 19.2, 19.3, 19.4, 19.5, 19.6, 19.7, 19.8, 19.9, 20.0, 20.1, 20.2, 20.3, 20.4, 20.5, 20.6, 20.7, 20.8, 20.9, 21.0, 21.1, 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 21.8, 21.9, 22.0, 22.1, 22.2, 22.3, 22.4, 22.5, 22.6, 22.7, 22.8, 22.9, 23.0, 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 24.0, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 25.0, 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7, 25.8, 25.9, 26.0, 26.1, 26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 27.0, 27.1, 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 28.0, 28.1, 28.2, 28.3, 28.4, 28.5, 28.6, 28.7, 28.8, 28.9, 29.0, 29.1, 29.2, 29.3, 29.4, 29.5, 29.6, 29.7, 29.8, 29.9, 30.0, 30.1, 30.2, 30.3, 30.4, 30.5, 30.6, 30.7, 30.8, 30.9, 31.0, 31.1, 31.2, 31.3, 31.4, 31.5, 31.6, 31.7, 31.8, 31.9, 32.0, 32.1, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7, 32.8, 32.9, 33.0, 33.1, 33.2, 33.3, 33.4, 33.5, 33.6, 33.7, 33.8, 33.9, 34.0, 34.1, 34.2, 34.3, 34.4, 34.5, 34.6, 34.7, 34.8, 34.9, 35.0, 35.1, 35.2, 35.3, 35.4, 35.5, 35.6, 35.7, 35.8, 35.9, 36.0, 36.1, 36.2, 36.3, 36.4, 36.5, 36.6, 36.7, 36.8, 36.9, 37.0, 37.1, 37.2, 37.3, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.0, 38.1, 38.2, 38.3, 38.4, 38.5, 38.6, 38.7, 38.8, 38.9, 39.0, 39.1, 39.2, 39.3, 39.4, 39.5, 39.6, 39.7, 39.8, 39.9, 40.0, 40.1, 40.2, 40.3, 40.4, 40.5, 40.6, 40.7, 40.8, 40.9, 41.0, 41.1, 41.2, 41.3, 41.4, 41.5, 41.6, 41.7, 41.8, 41.9, 42.0, 42.1, 42.2, 42.3, 42.4, 42.5, 42.6, 42.7, 42.8, 42.9, 43.0, 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 43.7, 43.8, 43.9, 44.0, 44.1, 44.2, 44.3, 44.4, 44.5, 44.6, 44.7, 44.8, 44.9, 45.0, 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 46.0, 46.1, 46.2, 46.3, 46.4, 46.5, 46.6, 46.7, 46.8, 46.9, 47.0, 47.1, 47.2, 47.3, 47.4, 47.5, 47.6, 47.7, 47.8, 47.9, 48.0, 48.1, 48.2, 48.3, 48.4, 48.5, 48.6, 48.7, 48.8, 48.9, 49.0, 49.1, 49.2, 49.3, 49.4, 49.5, 49.6, 49.7, 49.8, 49.9, 50.0, 50.1, 50.2, 50.3, 50.4, 50.5, 50.6, 50.7, 50.8, 50.9, 51.0, 51.1, 51.2, 51.3, 51.4, 51.5, 51.6, 51.7, 51.8, 51.9, 52.0, 52.1, 52.2, 52.3, 52.4, 52.5, 52.6, 52.7, 52.8, 52.9, 53.0, 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7, 53.8, 53.9, 54.0, 54.1, 54.2, 54.3, 54.4, 54.5, 54.6, 54.7, 54.8, 54.9, 55.0, 55.1, 55.2, 55.3, 55.4, 55.5, 55.6, 55.7, 55.8, 55.9, 56.0, 56.1, 56.2, 56.3, 56.4, 56.5, 56.6, 56.7, 56.8, 56.9, 57.0, 57.1, 57.2, 57.3, 57.4, 57.5, 57.6, 57.7, 57.8, 57.9, 58.0, 58.1, 58.2, 58.3, 58.4, 58.5, 58.6, 58.7, 58.8, 58.9, 59.0, 59.1, 59.2, 59.3, 59.4, 59.5, 59.6, 59.7, 59.8, 59.9, 60.0, 60.1, 60.2, 60.3, 60.4, 60.5, 60.6, 60.7, 60.8, 60.9, 61.0, 61.1, 61.2, 61.3, 61.4, 61.5, 61.6, 61.7, 61.8, 61.9, 62.0, 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, 62.7, 62.8, 62.9, 63.0, 63.1, 63.2, 63.3, 63.4, 63.5, 63.6, 63.7, 63.8, 63.9, 64.0, 64.1, 64.2, 64.3, 64.4, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.1, 65.2, 65.3, 65.4, 65.5, 65.6, 65.7, 65.8, 65.9, 66.0, 66.1, 66.2, 66.3, 66.4, 66.5, 66.6, 66.7, 66.8, 66.9, 67.0, 67.1, 67.2, 67.3, 67.4, 67.5, 67.6, 67.7, 67.8, 67.9, 68.0, 68.1, 68.2, 68.3, 68.4, 68.5, 68.6, 68.7, 68.8, 68.9, 69.0, 69.1, 69.2, 69.3, 69.4, 69.5, 69.6, 69.7, 69.8, 69.9, 70.0, 70.1, 70.2, 70.3, 70.4, 70.5, 70.6, 70.7, 70.8, 70.9, 71.0, 71.1, 71.2, 71.3, 71.4, 71.5, 71.6, 71.7, 71.8, 71.9, 72.0, 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 73.0, 73.1, 73.2, 73.3, 73.4, 73.5, 73.6, 73.7, 73.8, 73.9, 74.0, 74.1, 74.2, 74.3, 74.4, 74.5, 74.6, 74.7, 74.8, 74.9, 75.0, 75.1, 75.2, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9, 76.0, 76.1, 76.2, 76.3, 76.4, 76.5, 76.6, 76.7, 76.8, 76.9, 77.0, 77.1, 77.2, 77.3, 77.4, 77.5, 77.6, 77.7, 77.8, 77.9, 78.0, 78.1, 78.2, 78.3, 78.4, 78.5, 78.6, 78.7, 78.8, 78.9, 79.0, 79.1, 79.2, 79.3, 79.4, 79.5, 79.6, 79.7, 79.8, 79.9, 80.0, 80.1, 80.2, 80.3, 80.4, 80.5, 80.6, 80.7, 80.8, 80.9, 81.0, 81.1, 81.2, 81.3, 81.4, 81.5, 81.6, 81.7, 81.8, 81.9, 82.0, 82.1, 82.2, 82.3, 82.4, 82.5, 82.6, 82.7, 82.8, 82.9, 83.0, 83.1, 83.2, 83.3, 83.4, 83.5, 83.6, 83.7, 83.8, 83.9, 84.0, 84.1, 84.2, 84.3, 84.4, 84.5, 84.6, 84.7, 84.8, 84.9, 85.0, 85.1, 85.2, 85.3, 85.4, 85.5, 85.6, 85.7, 85.8, 85.9, 86.0, 86.1, 86.2, 86.3, 86.4, 86.5, 86.6, 86.7, 86.8, 86.9, 87.0, 87.1, 87.2, 87.3, 87.4, 87.5, 87.6, 87.7, 87.8, 87.9, 88.0, 88.1, 88.2, 88.3, 88.4, 88.5, 88.6, 88.7, 88.8, 88.9, 89.0, 89.1, 89.2, 89.3, 89.4, 89.5, 89.6, 89.7, 89.8, 89.9, 90.0, 90.1, 90.2, 90.3, 90.4, 90.5, 90.6, 90.7, 90.8, 90.9, 91.0, 91.1, 91.2, 91.3, 91.4, 91.5, 91.6, 91.7, 91.8, 91.9, 92.0, 92.1, 92.2, 92.3, 92.4, 92.5, 92.6, 92.7, 92.8, 92.9, 93.0, 93.1, 93.2, 93.3, 93.4, 93.5, 93.6, 93.7, 93.8, 93.9, 94.0, 94.1, 94.2, 94.3, 94.4, 94.5, 94.6, 94.7, 94.8, 94.9, 95.0, 95.1, 95.2, 95.3, 95.4, 95.5, 95.6, 95.7, 95.8, 95.9, 96.0, 96.1, 96.2, 96.3, 96.4, 96.5, 96.6, 96.7, 96.8, 96.9, 97.0, 97.1, 97.2, 97.3, 97.4, 97.5, 97.6, 97.7, 97.8, 97.9, 98.0, 98.1, 98.2, 98.3, 98.4, 98.5, 98.6, 98.7, 98.8, 98.9, 99.0, 99.1, 99.2, 99.3, 99.4, 99.5, 99.6, 99.7, 99.8, 99.9, 100.0, 100.1, 100.2, 100.3, 100.4, 100.5, 100.6, 100.7, 100.8, 100.9, 101.0, 101.1, 101.2, 101.3, 101.4, 101.5, 101.6, 101.7, 101.8, 101.9, 102.0, 102.1, 102.2, 102.3, 102.4, 102.5, 102.6, 102.7, 102.8, 102.9, 103.0, 103.1, 103.2, 103.3, 103.4, 103.5, 103.6, 103.7, 103.8, 103.9, 104.0, 104.1, 104.2, 104.3, 104.4, 104.5, 104.6, 104.7, 104.8, 104.9, 105.0, 105.1, 105.2, 105.3, 105.4, 105.5, 105.6, 105.7, 105.8, 105.9, 106.0, 106.1, 106.2, 106.3, 106.4, 106.5, 106.6, 106.7, 106.8, 106.9, 107.0, 107.1, 107.2, 107.3, 107.4, 107.5, 107.6, 107.7, 107.8, 107.9, 108.0, 108.1, 108.2, 108.3, 108.4, 108.5, 108.6, 108.7, 108.8, 108.9, 109.0, 109.1, 109.2, 109.3, 109.4, 109.5, 109.6, 109.7, 109.8, 109.9, 110.0, 110.1, 110.2, 110.3, 110.4, 110.5, 110.6, 110.7, 110.8, 110.9, 111.0, 111.1, 111.2, 111.3, 111.4, 111.5, 111.6, 111.7, 111.8, 111.9, 112.0, 112.1, 112.2, 112.3, 112.4, 112.5, 112.6, 112.7, 112.8, 112.9, 113.0, 113.1, 113.2, 113.3, 113.4, 113.5, 113.6, 113.7, 113.8, 113.9, 114.0, 114.1, 114.2, 114.3, 114.4, 114.5, 114.6, 114.7, 114.8, 114.9, 115.0, 115.1, 115.2, 115.3, 115.4, 115.5, 115.6, 115.7, 115.8, 115.9, 116.0, 116.1, 116.2, 116.3, 116.4, 116.5, 116.6, 116.7, 116.8, 116.9, 117.0, 117.1, 117.2, 117.3, 117.4, 117.5, 117.6, 117.7, 117.8, 117.9, 118.0, 118.1, 118.2, 118.3, 118.4, 118.5, 118.6, 118.7, 118.8, 118.9, 119.0, 119.1, 119.2, 119.3, 119.4, 119.5, 119.6, 119.7, 119.8, 119.9, 120.0, 120.1, 120.2, 120.3, 120.4, 120.5, 120.6, 120.7, 120.8, 120.9, 121.0, 121.1, 121.2, 121.3, 121.4, 121.5, 121.6, 121.7, 121.8, 121.9, 122.0, 122.1, 122.2, 122.3, 122.4, 122.5, 122.6, 122.7, 122.8, 122.9, 123.0, 123.1, 123.2, 123.3, 123.4, 123.5, 123.6, 123.7, 123.8, 123.9, 124.0, 124.1, 124.2, 124.3, 124.4, 124.5, 124.6, 124.7, 124.8, 124.9, 125.0, 125.1, 125.2, 125.3, 125.4, 125.5, 125.6, 125.7, 125.8, 125.9, 126.0, 126.1, 126.2, 126.3, 126.4, 126.5, 126.6, 126.7, 126.8, 126.9, 127.0, 127.1, 127.2, 127.3, 127.4, 127.5, 127.6, 127.7, 127.8, 127.9, 128.0, 128.1, 128.2, 128.3, 128.4, 128.5, 128.6, 128.7, 128.8, 128.9, 129.0, 129.1, 129.2, 129.3, 129.4, 129.5, 129.6, 129.7, 129.8, 129.9, 130.0, 130.1, 130.2, 130.3, 130.4, 130.5, 130.6, 130.7, 130.8, 130.9, 131.0, 131.1, 131.2, 131.3, 131.4, 131.5, 131.6, 131.7, 131.8, 131.9, 132.0, 132.1, 132.2, 132.3, 132.4, 132.5, 132.6, 132.7, 132.8, 132.9, 133.0, 133.1, 133.2, 133.3, 133.4, 133.5, 133.6, 133.7, 133.8, 133.9, 134.0, 134.1, 134.2, 134.3, 134.4, 134.5, 134.6, 134.7, 134.8, 134.9, 135.0, 135.1, 135.2, 135.3, 135.4, 135.5, 135.6, 135.7, 135.8, 135.9, 136.0, 136.1, 136.2, 136.3, 136.4, 136.5, 136.6, 136.7, 136.8, 136.9, 137.0, 137.1, 137.2, 137.3, 137.4, 137.5, 137.6, 137.7, 137.8, 137.9, 138.0, 138.1, 138.2, 138.3, 138.4, 138.5, 138.6, 138.7, 138.8, 138.9, 139.0, 139.1, 139.2, 139.3, 139.4, 139.5, 139.6, 139.7, 139.8, 139.9, 140.0, 140.1, 140.2, 140.3, 140.4, 140.5, 140.6, 140.7, 140.8, 140.9, 141.0, 141.1, 141.2, 141.3, 141.4, 141.5, 141.6, 141.7, 141.8, 141.9, 142.0, 142.1, 142.2, 142.3, 142.4, 142.5, 142.6, 142.7, 142.8, 142.9, 143.0, 143.1, 143.2, 143.3, 143.4, 143.5, 143	



CHARCOAL TIN PLATE.		
1 C 10x14 Prime Charcoal.....	12.50	
12x12.....	14.00	
14x20.....	14.25	
1 X 10x14.....	16.25	
12x12.....	16.25	
14x20.....	16.25	
For each additional X add.....		2.25
COKE TIN PLATE.		
Best.....	34 Quality.	Ordinary
Ordinary.....	34 Quality.	P@ \$11.00
1 C 10x14.....	\$12.75	
12x12.....	13.00	
14x20.....	13.25	
TERMS PLATE.		
Prime Char.....	34 qual.	Coke.....
1 C 14x20.....	\$12.25	10.50 @ 11.25
11x20 @ 11.75.....		
1 X 14x20.....	14.00	
21x42.....	17.00 or Block, \$1.50 per 100 lbs. Sheet.	
2 1/2 c. P. M. All subject to a reduction of 10 per cent. each 100 c.		
Sheet.....		open 11c

### Paper Stock, Old Metals, &c.

(Dealers' Selling Prices.)	
Canvas lines.....	6 @ 6 1/2
" cotton, No. 1.....	7 1/2 @ 7 3/4
" No. 2.....	4
White linen rags, No. 1.....	7 @ 7 1/2
" No. 2.....	4 1/2 @ 5
Colored.....	8 @ 8 1/2
Mixed woollens.....	3 @ 3 1/2
Soft woollens.....	3 1/2 @ 4
Gunny bagging.....	1 1/2 @ 1 3/4
Joint Butts.....	1 1/2 @ 1 3/4
Kentucky bagging.....	3 1/2 @ 3 3/4
Book stock.....	4 1/2 @ 4 3/4
Waste paper and scraps.....	2 1/2 @ 3
Rope cuttings.....	4 @ 4 1/2
Kentucky Bale rope.....	4 1/2 @ 5
Oakum junk, No. 1.....	4 1/2 @ 5
" No. 2.....	4 @ 4 1/2
Grass rope.....	4 1/2 @ 5
Tarred Shaking.....	1 1/2 @ 2
Old Metal.	
Copper.....	26 @ 27
Yellow metal.....	18 @ 20
Brass.....	18 @ 20
Heavy Composition.....	21 @ 23
Old lead, solid.....	6 1/2 @ 7
Tea lead.....	1 1/2 @ 1 3/4
Wrought iron.....	1 1/2 @ 1 3/4
Sheet iron.....	1 @ 1 1/4
Cast iron.....	1 1/2 @ 1 3/4
Machinery iron.....	2 @ 2 1/2
Zinc.....	20 @ 21
Pewter, No. 1.....	10 @ 11
" No. 2.....	7
Spelter.....	7

### Paints, Oils, etc.

Paints.	
Black, lamp—Coach Painters.....	15 @ 20c
" Ordinary.....	15c
" Ivory Drop, fair.....	15c
Black Paint, in oil.....	15c
Blue, Prussian, fair to best.....	60 @ 75c
" in oil.....	15 @ 20c
" Chinese, dry.....	25 @ 30c
" Ultramarine.....	15 @ 20c
Brown, Spanish.....	15c
" Van Dyke.....	15 @ 20c
Carmine, 40.....	15 @ 20c
Green, Chrome.....	15 @ 20c
" Paris.....	50c; best, 40c
" in oil.....	50c; best, 40c
Mineral Paints.....	15 @ 20c
" Orange Mineral.....	15 @ 20c
Red Lead, American.....	9c
" English.....	10c
" Venetian (dry).....	15 @ 20c
" in oil.....	15 @ 20c
" Indian, dry.....	15 @ 20c
Rose Pink.....	15 @ 20c
Siena, American, Raw.....	15 @ 20c
" Burnt.....	15 @ 20c
" Raw.....	15 @ 20c
Umber, Burnt.....	15 @ 20c
" Raw.....	15 @ 20c
Vermilion, Chinese.....	15 @ 20c
" English.....	15 @ 20c
" Trieste.....	15 @ 20c
American, Common.....	15 @ 20c
White Lead, American, pure dry.....	11c
" in oil.....	12c
White, Paris, English, prime.....	12c
Yellow Ochre.....	12c
" in oil.....	12c
Vermont.....	17 @ 20c
" in oil.....	18 @ 20c
Zinc White, American No. 1, dry.....	11c
" in oil.....	12c
" French (Paris).....	12c
Oils.	
Linseed Raw.....	7 gal. casks, 90c; blis, 94c
" Polished.....	90c
Whale, Crude.....	90c
Spruce, Crude.....	90c
" Winter unbleached.....	1.00
" Bleached.....	1.00
Seal, Extra Reduced.....	87c
" Pure Winter.....	87c
" Spring.....	87c
Cotton seed, Crude.....	87c
" Southern Yellow.....	87c
" White.....	87c
Natural Lubricating.....	87c
Sundries.	
Asphaltum.....	9c
Belgium.....	9c
Chalk.....	9c
" Block.....	9c
Dryer, Patent, Amn.....	9c
" English.....	9c
Flocks.....	9c
Frosting.....	9c
Glass, White.....	9c
" Sheet.....	9c
Glaziers' Points, Zinc.....	9c
Gum, Copal.....	9c
" Damar.....	9c
" Shellac, English.....	9c
" Large.....	9c
Pumice Stone, selected Lump.....	4 @ 4c
" powdered.....	4c
Putty in bladders.....	4c
" in bulk.....	4c
Rotten Stone, soft, English.....	4c
Spirits Turpentine.....	4c
Whiting, Spanish.....	14c

French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE.	
SIZES.	I. II. III. IV.
6 x 8 to 10 x 15.....	10.25 10.75 10.90 11.25
11 x 14 & 12 x 15.....	11.25 11.50 11.75 12.00
10 x 16 to 14 x 26.....	12.50 13.00 13.25 13.50
15 x 20 to 20 x 30.....	15.25 15.50 15.75 16.00
15 x 26 to 20 x 30.....	16.25 16.50 16.75 17.00
22 x 30 to 24 x 30.....	17.25 17.50 17.75 18.00
26 x 36 to 34 x 36.....	20.25 20.50 20.75 21.00
26 x 36 to 34 x 44.....	21.25 21.50 21.75 22.00
28 x 44 to 30 x 50.....	24.00 24.50 24.75 25.00
30 x 50 to 34 x 54.....	27.25 27.50 27.75 28.00
34 x 54 to 34 x 60.....	31.50 31.75 32.00 32.25
36 x 60 to 40 x 60.....	37.00 37.50 38.00 38.50

DOUBLE.	
SIZES.	I. II. III. IV.
6 x 8 to 10 x 15.....	18.00 18.50 18.75 19.25
11 x 14 & 12 x 15.....	19.25 19.50 19.75 20.00
10 x 16 to 14 x 26.....	21.25 21.50 21.75 22.00
15 x 20 to 20 x 30.....	24.00 24.50 24.75 25.00
15 x 26 to 20 x 30.....	25.00 25.50 25.75 26.00
22 x 30 to 24 x 30.....	27.00 27.50 27.75 28.00
26 x 36 to 34 x 36.....	30.00 30.50 30.75 31.00
26 x 36 to 34 x 44.....	31.00 31.50 31.75 32.00
28 x 44 to 30 x 50.....	33.00 33.50 33.75 34.00
30 x 50 to 34 x 54.....	36.00 36.50 36.75 37.00
34 x 54 to 34 x 60.....	40.00 40.50 40.75 41.00
36 x 60 to 40 x 60.....	45.00 45.50 45.75 46.00

Sizes above—\$12 1/2 box extra for every five inches. Discount to the trade 6%; 6 1/2% for large lots.

**A. C. Downing & Comp'y.**  
Importers of and Dealers in

**Window Glass,**  
FRENCH PICTURE  
And Car Glass, etc.

Estimates given by mail.  
57 Beekman & 87 Ann Sts  
NEW YORK.

## HORACE DURRIE, 97 Chambers and 81 Reade Streets, N. Y. Hardware Manufacturer, AND AGENT FOR

**RHODE ISLAND HORSE SHOE CO.**  
**L. COES & CO.'S GENUINE SCREW WRENCHES.**  
**NEW LONDON HORSE NAIL CO.**  
**WHEELER, MADDEN & CLEMSON.**  
**WHEELER, CLEMSON & CO., FILES.**  
**AMOSKEAG AXE CO.**  
**TUTTLE MANUFACTURING CO.**  
**EMPIRE MILLS TWINES.**  
**FRENCH, SWIFT & CO.'S AUGERS & BITTS.**  
**AUBURN TOOL CO.'S PLANES.**  
**WINSTED HOE CO.'S PLANTERS HOES AND TOE CALKS.**  
**WITHERBY TOOL CO.'S CHISELS, DRAWING KNIVES AND BORING MACHINES.**  
**OHIO BUTT CO.**  
**STEPHENS & CO.'S RULES.**  
**FISHER & NORRIS, EAGLE ANVILS,**  
**BOSTON BELTING CO., RUBBER GOODS.**

## OHIO BUTT COMPANY, JOLIET, ILL.

MANUFACTURERS OF

## CAST BUTT HINGES,

Drilled and Wire Jointed, Fast and Loose, Loose Pin Reversible, Plain, Japanned, and Japanned with Silver Acorns. Loose Joint Japanned, and the same with Japanned or Silver Acorns.

We have appointed

## HORACE DURRIE,

No. 97 Chambers St., New York,

Our only Agent in NEW YORK, BOSTON, PHILADELPHIA and BALTIMORE, for the sale of our goods, and he is authorized to sell at our lowest factory rates.

Ohio Butt Co.



**L. COES & CO.,**  
Manufacturers of  
**L. COES' Genuine Improved PATENT SCREW WRENCHES,**  
Worcester, Mass.

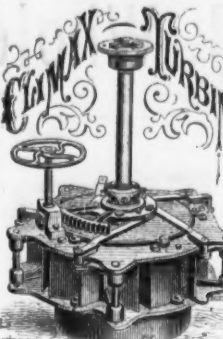


Our Mr. L. Coes, formerly senior member of the firm of L. & A. G. Coes, established in 1839, is the Original Inventor of the Screw Wrench, and has, by making the bar wider, where the strain comes most severe, and screwing a nut up firmly against four square shoulders inside the ferrule, thereby effectually preventing the ferrule from being thrust back into the handle or getting loose, and making a larger screw than in the old wrench, fully succeeded in making a 12 inch wrench stronger than a 15 inch made in the usual manner. All sizes are made in this way, and are undoubtedly the strongest and best finished Screw Wrenches in the market.

There are imitations of our goods offered for sale, that, without question, infringe on our Patents.

We hold Patents bearing date Nov. 10th, 1863 (re-issued June 1st, 1869), June 26th 1866, March 29th, 1869 (re-issued April 12th, 1870, and May 14th, 1872), which fully cover all our improvements. One of the above cuts represents a sectional view, showing the nut under the ferrule, and the strengthened bar, that part being covered by the jaw, as seen in the cut of wrench complete. None genuine unless stamped

**"L. COES & CO"**  
Warehouse, 97 Chambers and 81 Reade Streets, New York.  
**HORACE DURRIE, Agent.**  
Parties ordering from the New England States can order direct from the manufacturers  
**L. COES & CO.,**  
Worcester, Mass.



**Improved Stationary Engines.**  
Always on hand assortment of sizes from 10 to 200 horse power. Second-hand engines taken in exchange when desired.  
**Climax Turbine Water Wheels.**  
Assortment of sizes always on hand.  
**Pulleys, Shafting, Gearing and General Machinery.**  
Send for Circular.  
**WHITEHILL, SMITH & HAMPSON,**  
NEWBURCH, N. Y.



**Peck's Patent Drop Press**  
**MILO PECK & CO.**  
SOLE MANUFACTURERS.  
NEW HAVEN, CONN.

No.	Weight of Hammer.	Distance between Uprights.	Lift of Hammer.	Price Complete.
2	100 lbs.	8 in.	24 in.	\$ 320 00
3	150 "	10 "	30 "	467 00
4	250 "	12 "	30 "	750 00
5	400 "	16 "	30 "	900 00
6	650 "	16 "	30 "	1300 00
7	1000 "	16 "	30 "	1800 00
8	1200 "	16 "	30 "	2500 00

No.	Size of Die Bed.	Weight of Hammer.	Price of Drop without Lifter.	Price of Lifter.
1	6 in.	50 lbs.	\$ 137 50	\$ 82 50
2	8 "	100 "	212 50	137 50
3	10 "	150 "	300 00	200 00
4	12 "	250 "	400 00	340 00
5	16 "	400 "	550 00	430 00
6	20 "	650 "	750 00	590 00
7	24 "	1000 "	1200 00	890 00
8	36 "	1500 "	1850 00	1200 00

All sizes larger than No. 3 have Wrought Iron Cranks to the Lifter.  
Our Patent Drop Lifter can be applied to any Drop in use.

## Biddle Manufacturing Co., 102 Chambers Street, N. Y., Manufacturers of Hardware Specialties, Fine Tools, IMPROVED HAND AND POWER DRILL PRESSES, AND HAND AND POWER SHEARS AND PUNCH PRESSES.

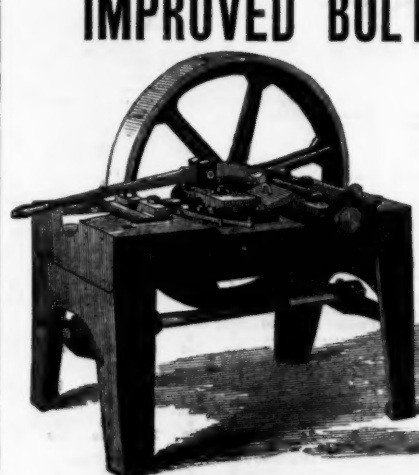


**Patent Self Feed Hand Drill.....** Price, \$50.00  
**Patent Self Feed Single Speed Power Drill, Counter Shaft and Pulleys complete.....** Price, 85.00  
**Patent Self Feed Three Speed Power Drill, Counter Shaft and Pulleys complete.....** Price, 150.00  
**Round Bar Hand Shear, cuts round iron, 1/2 to 1 1/2 inch.....** Price, \$ 6 to \$100  
**Square Bar Hand Shear, cuts square iron, 1/2 to 1 inch.....** Price, 30 to 100  
**Flat Bar Hand Shear, cuts 1/2 x 16 to 2 x 1/2.....** Price, 7 to 45  
**Plate Iron Hand Shear, cuts boiler plate any width, 3-16 to 3/8.....** Price, 45 to 130  
**Hand Punch Press, punches 1/2 x 1/2 to 1 x 1/2.....** Price, 25 to 300  
**Combined Hand Punch and Round and Flat Bar Shear, punches 1-16 x 1-16 to 1/2 x 1/2, cuts round iron 1/2 to 1, cuts flat bar 2 1/2 and under.....** Price, 15 to 190  
**Hand or Power Plate Iron Shear, cuts 1/2 boiler plate any width.....** Price, 175 to 230  
**Hand or Power Punch Press, punches 1/2 x 1/2 to 1 x 1/2.....** Price, 230 to 330  
**Power Round Bar Shear, cuts 1 1/2 and smaller sizes.....** Price, 175 to 275


All kinds of Die Forgings promptly attended to.  
Sole agents for the Pacific Coast,  
**CONROY, O'CONNOR & CO., San Francisco, Cal.**  
Send for Price List and Illustrated Catalogue.



**FREELAND TOOL WORKS,**  
No. 560 West 34th St., N. Y. (Successors to A. M. FREELAND.)  
Manufacturers of  
**Machinists' Tools.**  
Lathes, Planers, Slotting, Shaping, Drilling and Gear Cutting Machines, Surface Plates, Straight Edges and Special Tools, made to order.  
Planing, Turning, Screw Cutting, and Gear Cutting, for the trade.  
**THOMAS & CO.**



**IMPROVED BOLT MACHINERY.**  
**BOLT HEADER,**  
That will head 10,000 per day.  
**Single & Double Head BOLT CUTTERS,**  
That will cut from 5000 to 10,000 per day.  
Bolt Pointers, Tapping Lathes, Tire Blank and Rivet Headers, Engine Lathes, &c.  
Manufactured by  
**THE Chapin Machine Co.,**  
New Hartford, Conn.



**MIDDLETOWN TOOL CO.,**  
MIDDLETOWN, CONN.,  
MANUFACTURERS OF  
**The Celebrated "Baldwin" Plane Iron,**  
**HENSHAW'S PATENT HARNESS SNAPS**  
**GERMAN HARNESS SNAPS,**  
**PAT. GAFF TOP-SAIL SELF-MOUSING SHIP HOOKS**  
Plow, Villotter & Dado Stops of all kinds, Set Screws for Plows, Bench Plane Starts, &c. Patent Washer Cutters. Plan Iron Screws to order of any size.  
Send for Illustrated Catalogue and Price List.



# HAMPSON, WHITEHILL & CO.,

Successors to EDWARD P. HAMPSON,

38 Cortlandt Street, N. Y.

PORTABLE AND STATIONARY

## ENGINES AND BOILERS,

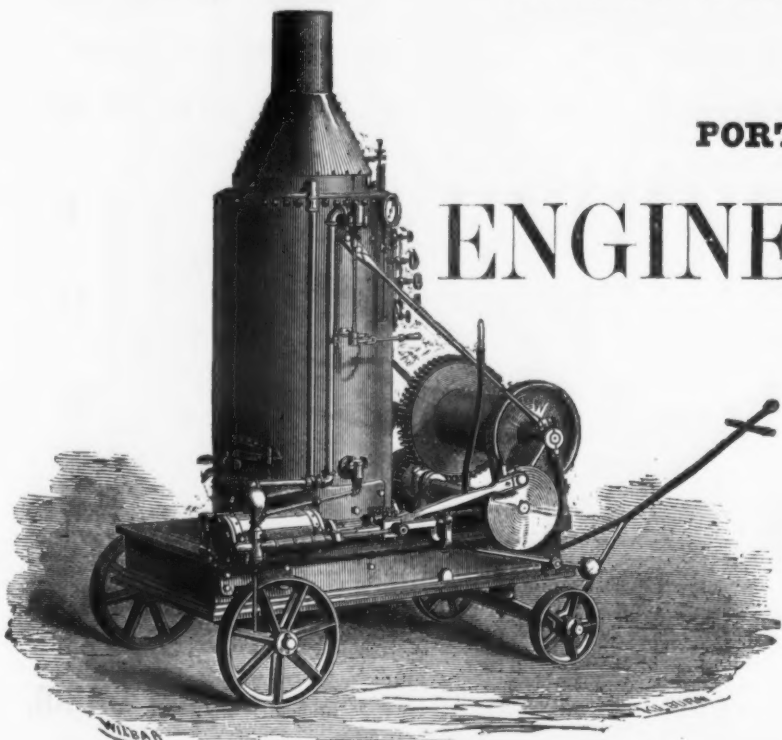
### SAW AND GRIST MILLS.

### WATER WHEELS,

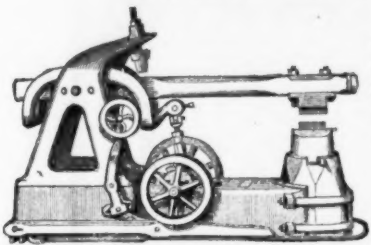
### PORTABLE HOISTING ENGINES, &c.

Works at NEWBURGH, N. Y.,

Whitehill, Smith & Hampson.



## BRADLEY'S CUSHIONED HAMMER.



This Hammer has many valuable improvements made useful in the device for cushioning the blow, thereby relieving all the working parts from that jar and concussion which is the destroying element of other Heve Hammers. It is made Adjustable in Line of Action, Length of Stroke, Rapidity of Motion, and Weight of Blow, all of which are controlled at the will of the operator. They have *Larger Capacity, Cost Less,* are more *Durable,* take up *Less Room,* do *More* and *Better Work* at *Less Expense* for Power, than any other Hammer in use. We guarantee them fully as recommended. For particular address

Bradley Manufacturing Co.  
SYRACUSE, NEW YORK.

## SELDEN PATENT DIRECT ACTION STEAM PUMP,

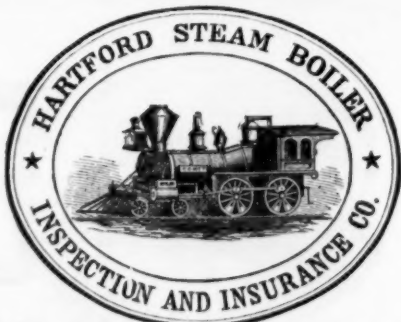
Patented August 2nd and  
December 20th, 1870.

Tank Pump, with Boiler  
Feed Attachment.

For Boiler Feeders,  
For Water Works,  
For Fire Pumps,  
For Mines, etc., etc.

And for all purposes for which Steam  
Pumps can be used. Sold under full  
guarantee. Money will be returned if,  
from any cause, they should prove unsat-  
isfactory. Send for Circular and Price  
List, fully describing them, to

A. CARR,  
43 Cortlandt Street,  
New York City.



CAPITAL - \$500,000.

Issues Policies of Insurance, after a careful Inspection of the Boilers

COVERING ALL LOSS OR DAMAGE TO  
**Boilers, Buildings and Machinery,**

ARISING FROM

**STEAM BOILER EXPLOSIONS.**

The Business of the Company includes all kinds of STEAM BOILERS.

Full information concerning the plan of the Company's operations can be obtained at the  
COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.  
J. M. ALLEN Pres. CHAS. M. BEACH, Vice-Pres. J. B. PIERCE, Sec'y

Board of Directors:

J. M. ALLEN, President.  
LUCIUS J. HENDEE, Pres't Etna Fire Ins. Co.  
FRANK W. CHENEY, Asst Treas. Cheney Brothers  
SHE Manufacturing Co.  
CHARLES M. BEACH, of Beach & Co.  
DANIEL PHILLIPS, of Adams Express Co.  
GEO. M. BATHOLOMEW, Pres't Amer. Nat'l Bank.  
RICHARD W. H. JARVIS, Pres't Colt's Fire Arms  
Manufacturing Co.  
EDWARD M. REED, Sup't Hartford & N. Haven  
Hou. CHAS. M. FOND, Treas. State of Connecticut.  
THOMAS O. ENDERS, Sec'y Etna Life Ins. Co.  
LEVERETT BRAINARD, of Case, Lockwood & Brain-  
ard  
GEN. WM. B. FRANKLIN, Vice Pres't Colt's Pat. Fire  
Arms Mfg. Co.  
AUSTIN DUNHAM, Pres't Willimantic Loom Co.  
GEO. CROMPTON, Crompton Loom Works, Worcester.  
EARL P. MASON, Pres't Prov. & Wor. R. R. Prov.  
WILLIAM ADAMSON, of Baeder, Adamson & Co.,  
Philadelphia.  
WM. B. BEMENT, of Wm. B. Bement & Co., Phila.  
THEO. H. BABCOCK, Manager.  
New York Branch, No. 1 Park Place.

## OWENS, LANE & DYER Machine Company



For anything wanted in the Machinery line, address them at  
HAMILTON, OHIO, or ST. LOUIS, MO.  
Making a Specialty in  
Engines and Machinery for Mining.

RIEHL BROTHERS,  
Ninth Street, near Coates, Philadelphia.  
New York Store, 90 Liberty Street,  
Pittsburgh Store, 75 Water Street.



"The Celebrated Stock House Scale,"  
New Style Testing Machines, all sizes,  
Wrought Iron Lever R. R. Track Scales,  
Parallel Crane Beams and Mortising Ma-  
chines.

White Lead, &c.

JOHN JEWETT & SONS  
Manufacturers of the well known Brand of  
**WHITE LEAD.**



TRADE MARK.  
Also Manufacturers of  
**LINSEED OIL**  
AND FLOOR OIL CLOTHS,  
182 Front Street NEW YORK.



TRADE MARK.  
The Atlantic White Lead and Lin-  
seed Oil Company,  
MANUFACTURERS OF  
White Lead (Atlantic), Red Lead  
Litharge & Linseed Oil.  
ROBERT COLGATE & CO.,  
287 Pearl Street, New York.

Cornell Lead Co.,

Cor. Delaware and Virginia Streets, BUFFALO, N. Y.



TRADE MARK.  
Manufacturers  
**WHITE LEAD** Dry and in Oil,  
Lead Pipe, Sheet and Bar Lead.  
J. G. CORNELL, Pres't. A. F. THOMPSON, Vice-Pres't.  
B. DUGGLAN CORNELL, Sec'y.

White Lead, &c.

John T. Lewis & Bros.,

No. 231 South Front St.,  
PHILADELPHIA.



TRADE MARK.  
MANUFACTURERS OF  
**PURE WHITE LEAD, RED LEAD,**  
Litharge, Orange Mineral,  
Linseed Oil  
AND PAINTERS' COLORS.

Brooklyn White Lead Co.



TRADE MARK.  
White Lead, Red Lead and  
Litharge.  
89 Maiden Lane, NEW YORK.  
FISHER HOWE, Treas.



Union White Lead Mfg. Company,  
26 Burling Slip, New York.  
B. W. How, Secretary. James How, President  
MANUFACTURERS OF  
White Lead, Red Lead, Litharge  
Orange Mineral.

## NEWCOMB BRO'S SONS,

Manufacturers of

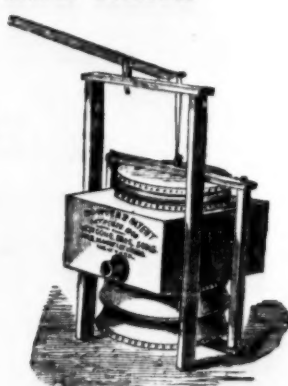
### Smiths', Moulders' and Hand

Also the Sole Manufacturers of

Bowden's Patent

TRIPLE-ACTION

### Bellows.



These Bellows are superior to all others now in use.

For further particulars send for descriptive circular and price list.

586 Water St., near Montgomery, N. Y.

Canal Street, East Broadway and South Street Cars cross Montgomery St.



No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.  
FOR PRICES ADDRESS  
**ENTERPRISE MFG. CO., of Pa., or GRAHAM & HAINES, Agents,**  
**HARDWARE MANUFACTURERS,**  
**W. Cor. of American and Dauphin Sts., PHILADELPHIA.**  
**88 Chambers St., New York.**

**SANDUSKY TOOL CO.,**  
MANUFACTURERS OF  
**Planes, Plane Irons, Carpenters', Cabinet Makers' and  
Coopers' Tools,**  
Bench, Hand and Tail Screws,  
and Chisel,  
File and Auger Handles.



**SANDUSKY TOOL CO., Sandusky, Ohio, or GRAHAM & HAINES, 88 Chambers Street, N. Y.**

**Headquarters for**  
**Henry Disston & Sons' Saws,**  
**Hand, Mill, Circular and Cross Cut.**  
**ALSO,**  
**Plumbs and Levels, Try Squares, Gauges, Trowels**  
**and Barker's Reversible Butt.**  
**A full assortment constantly on hand. Address orders to**  
**GRAHAM & HAINES, 88 Chambers Street, N. Y.**

**Samuel Loring's Tacks and Rivets.**  
 Warehouse, 88 Chambers Street, New York.  
 A full assortment of  
**TACKS** (all kinds), **BRADS**, **TRUNK**, **CLOUT**, **HUNGARIAN** and  
**FINISHING NAILS.**  
 Also, **BLACK** and **TINNED RIVETS** always on hand for  
 immediate delivery, if required.  
**GRAHAM & HAINES**, 88 Chambers Street, New York, Agents.

# Philadelphia Tool Co.,



MANUFACTURERS OF

## Davis' Patent Duplex Wrench,

A tool well made of **Best Materials**, combining all the good qualities of a regular Nut Wrench of equal size with that of at least six pairs of Pipe Tongs. For circulars and price lists, address,  
**PHILADELPHIA TOOL CO., Office & Works, S. W. cor. 13th & Buttonwood Streets, Phila.,**  
Or **GRAHAM & HAINES, Agents, 88 Chambers Street N. Y.**



**AMERICAN BUTT CO.,**  
**PROVIDENCE, R. I., Manufacturers of**  
**Cast Butt Hinges,**  
 AND  
**BUILDERS'**  
**HARDWARE.**

New York Warehouse with  
**Messrs. GRAHAM & HAINES,**  
 No. 88 Chambers Street.

Send for Price List,  
 All kinds of  
**SMALL CASTINGS**  
 made to order.

**Railway, Blacksmiths' and  
Miners' Tools,**

Railroad and Coal Picks, Crow Bars, Mauls,  
Tamping Bars and Picks, Rail Tongs, Sledge,  
Hand, Stone and Striking Hammers, Smiths'  
Tongs, Gas Pipe Tongs, Telegraph Pole Bars,  
Cold Chisels, Wedges, Froes, Cast Steel Drills.

Self-colored Picks..... \$3.00 per dozen.  
Ground and Polished..... 960 "

Send for Catalogue.

**JAMES E. HALSEY,**  
Manufacturers' Agent,  
76 Rouse Street, New York.


**Edge Tools,**  
**BROAD, SHINGLING AND CLAW**  
**HATCHETS.**  
**The best low priced Goods**  
**in the Market.**  
Shingling Hatchets from \$4.00 to \$6.00 per dozen.  
Claw                   \$5.00 to \$6.50                   "  
Ohio and Kentucky Pattern Chopping Axes, all  
weights. The Trade only supplied.  
Send for Price List.

**JAMES E. HALSEY, Mrs.' Agent,**  
**76 Reade Street, New York.**

# PYROMETERS

for BLAST FURNACES.

E. BROWN'S STANDARD PORTABLE,  
E. Brown's Improved  
Gauntlet



**Edw. BROWN,**  
311 Walnut St., Philadelphia.

ALSO FOR SALE

## PYROMETERS

For Baker's Ovens, Boiler Flues,  
Galvanizing Baths, Oil Stills, Vul-  
canizers, Superheated Steam.

E. Brown's Portable Blast Gauge  
for the plug hole, Steam Gauges,  
Blast Gauges, Mercury Gauges,  
Recording Steam Gauges, Engine  
Counters, Indicators for ascertain-  
ing the Horse Power.

A detailed illustration of a circular pyrometer gauge. The gauge has a thick, metallic-looking outer ring. Inside this ring is a circular scale with two concentric arcs. The outer arc is marked with numbers from 0 to 200 in increments of 20. The inner arc is marked with numbers from 0 to 40 in increments of 10. The text 'E. BROWN &amp; MILADA.' is printed across the center of the gauge. A needle with a decorative, pointed tip is positioned to indicate a reading on the scale. Below the gauge, there is a small, cylindrical component, likely a thermocouple or a mounting bracket.

## CINCINNATI INDUSTRIAL EXPOSITION.

## Leading Industrial Fair of America.

Exhibiting space nearly Eight Acres! One Acre of Machinery in Motion!  
**OPEN SEPT. 3d TO OCT. 4th; GOODS RECEIVED UNTIL SEPT. 30th.**  
**600,000 Visitors in 1872.**

G.  
E.  
R.  
S.

1  
8  
1  
0

*Genuine Emerson's Razor Strap.*

[ESTABLISHED 1810.]



Pat'd according to Act of Congress in the year 1863, by Benj. F. Badger, in the Clerk's Office of the U.S. Court of Mass.

Chain and Pulley for Heavy Sash

**F. & L. MANY & MARSHALL,**  
48 WARREN STREET, NEW YORK,  
Manufacturers of every description of

**BUILDERS' HARDWARE,**  
Pure Bronzed Metal and Hand-Plated Knobs, Hinges, &c.,  
*Agents for Gautier's Bricks and Crucibles.*

AGENTS AND DEPOT OF THE TRENTON LOCK COMPANY.



William N. Jennings,  
**FINE PRINTING & STATIONERY**  
No. 43 Franklin Street,  
NEW YORK.

Get. Broadway & Elm St.,

**THOMAS MORTON,**  
Manufacturer of  
**Brass & Copper Chain,**

And patented attachments for same, for suspending windows, from 100 to 1500 lbs. Sashes can be suspended with my Chain and attachments in a shorter time and with less trouble than by using the ordinary common cord. I am now offering the Chain and fastenings cheaper than any other in the market. Also manufacturer of the **MORTON & BREMNER'S** Straight and Circular Spring Balances. Established in 1842.

Office, No. 15 Murray St., N. Y.



**The Hart, Bliven & Mead Mfg. Co.,**  
18 & 20 Cliff Street, and 243 & 245 Pearl Street, New York.  
Factories at KENSINGTON, CONN.  
MANUFACTURERS OF  
**CARRIAGE HARDWARE.**

Send for our new

Catalogue and Price List

Every style of Bands & Sockets in Silver, Nickel, Oroide & Gold Plated.

# Improved Door Knobs.

On the 10th January, 1865, we obtained Letters Patent for improved method of securing necks to Mineral and Porcelain Door Knobs, which improvement was used by us long enough to prove its utility, but on account of unsettled claim of joint ownership by former partner, its use was discontinued. Having now made a further improvement, for which we have made application for a Patent, we are now making the **BEST SECURED and MOST DURABLE** Mineral and Porcelain Door Knobs ever offered in this or other markets.

We solicit orders for these Knobs at our regular prices for old styles, with the understanding that if any can be loosened from or gotten off the necks without breaking the tops, they may be held by the purchaser subject to our order, with expenses added.

See *The Iron Age*, of August 21st., page 11, for reduced list prices on **Locks and Latches**; also, for illustrated description of our patent **Telescope Locks and Latches**, with patent **Flat Steel Perforated Keys**,



PATD, JAN 10<sup>th</sup> 1865.



Address  
**BRANFORD LOCK WORKS,**  
Branford, Conn.

OF THE HART, BLIVEN & MEAD MANUFACTURING CO., Agents,  
18 & 20 Cliff and 243 & 245 Pearl Streets, New York







## Steel.

THREE  
at CLASS PRIZE MEDALS.  
CLASSES 1, 21, 22,  
Great Exhibition of Industry,  
LONDON, 1851.

MEDAL OF HONOUR,  
SOCIETY OF ARTS & INDUSTRY,  
LONDON, 1856.

1st CLASS  
PRIZE MEDAL, CLASS 1st  
UNIVERSAL  
EXHIBITION OF INDUSTRY  
PARIS, 1855.

# COCKER BROTHERS

SUCCESSORS TO  
**SAM'L COCKER & SON,**  
(Established 1752.)  
**SHEFFIELD, ENGLAND.**

MANUFACTURERS OF  
CAST, SHEET, AND BLISTER STEEL, OF EVERY DESCRIPTION.  
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;  
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.

BEST CAST STEEL FILES, SAWS, EDGE TOOLS,  
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,  
FISH HOOKS, NEEDLES, &c.

ALSO  
GENERAL MERCHANTS.  
Agent, JONATHAN HATTERSLEY, Cincinnati, Ohio

## WM. JESSOP & SONS,

MANUFACTURERS OF  
**STEEL,**  
AND IMPORTERS OF IRON  
SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:  
NEW YORK, Nos. 91 and 93 John Street. BOSTON, No. 134 North Street.  
ST. LOUIS, No. 714 North Second Street.

AGENCIES:  
PHILADELPHIA, Jas. C. Hand & Co. PROVIDENCE, Nightingale & Eilton.  
CHICAGO, Greer, Adams & Co. NEW ORLEANS, Folger & Co.  
CINCINNATI, Augustus Wessel. SAN FRANCISCO, Huntington, Hopkins & Co.

## F. W. MOSS,

Successor to JOSHUA MOSS & GAMBLE BROTHERS,  
MANUFACTURER AND IMPORTER OF  
**STEEL AND FILES.**

Principal Depots: 80 John Street, New York, and 512 Commerce Street, Philadelphia.  
MOSS & GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,  
Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURN-  
PUNCHES and all kinds of MACHINISTS' TOOLS.  
Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools,  
warranted not to crack in hardening. Taps of any size.  
Swede Spring Steel, especially adapted for Locomotive and Railway Car Springs.  
English Spring and Plow Plate Steel.  
Also, manufacturer of  
Sheet Ca. Steel, Shear, German, Round Machinery, Hammer, Fork and Shovel Steel  
And GENERAL MERCHANT.

A. M. F. WATSON, General Agent.

## WILSON HAWKSWORTH, ELLISON & CO.,

MANUFACTURERS OF  
**STEEL, STEEL WIRE, &C.,**  
AND GENERAL MERCHANTS.  
CARLISLE WORKS, SHEFFIELD, ENGLAND.

AGENCIES:

New York, 72 John Street.  
Philadelphia, 505 Commerce Street.  
Boston, 21 Oliver Street.

## BARROW HÆMATITE STEEL COMPANY,

LIMITED.



BARROW IN FURNESS,  
LANCASHIRE, ENGLAND.

MANUFACTURERS OF

Steel Rails, Tyres, Wheels,  
Axles, Shafting, Boiler & Ship Plates, Bessemer Pig Iron, etc., etc.

CHAS. CONGREVE & SON,

Sole Agents for the United States,  
104 & 106 John Street, opposite Cliff Street, NEW YORK.

## J. & RILEY CARR,

MANUFACTURERS OF SUPERIOR  
**STEEL**

For Tools, Cutlery, Saws, Files, Augers, Gimblets, &c.; Sheet Cast Steel for  
SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

**DOG BRAND FILES,**

Unsurpassed, if equalled, in quality.

Bailey Lane Works, Sheffield, England.

Warehouse 82 John St., New York.

established 1810.



HENRY MOORE, Attorney.

## Steel.

## SANDERSON BROTHERS & COMPANY,

(LIMITED)

MANUFACTURERS OF THE

## CELEBRATED CAST STEEL,

WARRANTED MOST SUPERIOR FOR TOOLS.

DARNALL WORKS,  
ATTERCLIFFE FORGE,  
WEST STREET WORKS,

SHEFFIELD, ENGLAND.

IMPORTERS OF FILES,

AND

AGENTS FOR ARMITAGE'S GENUINE MOUSEHOLE ANVILS.

NEW YORK, Edward Frith, 16 Cliff.

BOSTON, H. L. Richards, 18 Batterymarch.

PHILADELPHIA, Wm. H. Sowers.

CLEVELAND, O., Cleveland, Brown & Co.

NEW ORLEANS, Rich'd Rhodes, 71 Camp.

BALTIMORE, Md., Wm. H. Cole.

MONTREAL, Saint Paul St.

NEW HAVEN, Ct., Atwater, Wheeler & Co.

## FRANCIS HOBSON & SON,

97 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

JOHN HOGAN, Agent.

## S. & C. WARDLOW,

MANUFACTURERS OF THE CELEBRATED

## Cast and Double Shear STEEL,

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving,  
Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs,  
Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. & C. WARDLOW, 13 Gold Street, New York.

*In calling the attention of consumers of Steel in  
any of the markets above enumerated, we would respectfully assure  
them of our ability to supply an article that cannot be equalled in  
quality, temper, and adaptation in all respects to the various purposes  
for which it may be required. With a century of practical expe-  
rience in all departments of Steel manufacture, a long established  
reputation in England, and the Continent of Europe, and in the Eastern  
States principally of this Country, we encourage us to solicit a universal  
trial of our Steel for the above or other purposes for which a first  
class material in quality, temper, and durability is needed.*

## G. SANDERSON & CO.,

Manufacturers of all descriptions of

## STEEL.

Bailey Street and  
Broad Lane Steel Works, SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pegs, &c.

Makers of the Celebrated ROCK BORING DRILL STEEL.

Warehouse, 57 John Street, New York.

## JOHN A. GRISWOLD & CO.,

Troy, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

## Bessemer Railway Steel,

MERCHANT BARS, TIRE AND SHAFTING,

Railroad Iron, Pig Iron, Merchant and Ship Iron,

AGENCIES IN BOSTON AND PHILADELPHIA.

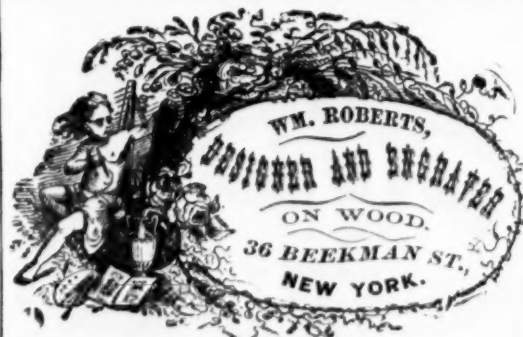
## D. G. GAUTIER & CO.,

MANUFACTURERS OF

Hammered and Rolled STEEL of every description  
JERSEY CITY, NEW JERSEY.

DUDLEY G. GAUTIER.

JOSIAH H. GAUTIER.



Established 1838.  
EVERY DESCRIPTION OF EN-  
GRAVING FOR

BOOK, CATALOGUE OR  
NEWSPAPER USE  
done at short notice.

**Machinery.**

VIEWS OF BUILDINGS

A SPECIALTY.

FIRST-CLASS WORK AT LOW

PRICES.

SATISFACTION GUARANTEED

## Steel.

## Sheffield Steel Works.

(Established in 1848.)

SINGER, NIMICK & CO.

Pittsburgh, Pa.,

Manufacturers of Extra Quality Tool

## CAST STEEL,

Patent Rolled

SAW PLATES,

All descriptions of Cast and German

Spring and Plow Steel

Elliptic and Side Springs, Seat Springs,

AXLES, STEEL TIRE,

Plow Wings, Shares, Cultivators,

Reaper Bars, Crow Bars, &c., &c.

Warehouse, 83 Water and 100 First Streets.

## ISAAC JENKS & SONS,

Minerva & Beaver Iron & Steel Works,

Wolverhampton, England,

MANUFACTURERS OF

"Jenks" Spring Steel, Cast and

Swedes Spring Steel,

TIRE, TOE CORK, SLEIGH SHOE,

BLISTER & PLOW STEEL.

Also, Plow and other Iron.

VAN WART & MCCOY, Agents,

43 Chambers St., New York.

A full assortment of "Jenks" Spring Steel in stock.

## MILLER, BARR & PARKIN,

Crescent Steel Works,

PITTSBURGH, PA.,

Manufacturers of all descriptions of

## STEEL

EQUAL TO ANY IN THE MARKET.

Office.....339 Liberty St.,

PITTSBURGH, PA.

## Gunpowder.

## GUNPOWDER.

## DUPONT'S

Sporting, Shipping, and Mining

## POWDER.

DUPONT'S GUNPOWDER MILLS,

ESTABLISHED IN 1801,

Have maintained their great reputation for 70  
years. Manufacture the

Celebrated Eagle Ducking, Eagle Rifle  
and Diamond Grain Powder.

Also, SPORTING, MINING, SHIPPING, AND BLAST-  
ING POWDER

of all kinds and descriptions.

For sale in all parts of the country. Represented  
by

F. L. KNEELAND,

70 Wall Street, NEW YORK.

## GUN-POWDER

LAFLIN & RAND POWDER CO.

21 Park Row, New York,

invite the attention of the the Hardware Trade to  
their facilities for delivering

BLASTING, MINING and RIFLE

## POWDER

IN EVERY PART OF THE UNITED STATES,  
from having agencies and magazines at all prominent  
points, beside our works at

Newburg, Saugerties, Kingston, and  
Catskill, N. Y.; Scranton, Carbon-  
dale, and Portville, Pa.; Balti-  
more, Md., and Plattville, Wis.

The superiority is well known of our brands  
Rifle Powder:

Orange Rifle, Orange Ducking

Lightning, Audubon.

SAFETY-FUSE at wholesale.



Steel.

HUSSEY, WELLS & CO.

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL,

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

Railroad Supplies, Homogeneous Plates

FOR LOCOMOTIVES, BOILERS AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

"Hussey, Wells & Co. Cast Spring Steel,"

For Elliptic Springs for Railroad Cars & Locomotives.

PENN AND SEVENTEENTH STS., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York. 139 & 141 Federal St., Boston. 88 Michigan Ave., Chicago.

Pittsburgh Steel Works

ESTABLISHED IN 1845.

ANDERSON & WOODS,

MANUFACTURERS OF

BEST REFINED CAST STEEL,

Cast and German Plow and Spring Steel,

FIRST AVE., AND ROSS ST., PITTSBURGH.

BRANCH HOUSES:

Nos. 74 and 75 North Street, Boston. C. H. WHITNEY & SON, 142 Greenwich Street, New York. W. F. POTTS, SON & CO., 125 Market Street, Philadelphia.

CHROME STEEL COMPANY,

MANUFACTURERS OF

CHROME CAST STEEL,

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—FOR EVERY PURPOSE.

Works and Offices—Kent Avenue and Keap Street, Brooklyn, E. D., N. Y.

Principal Agencies:

Hall, Kimbark & Co., Chicago, Ill. Harris, Rice & Co., St. Louis, Mo. Horace P. Tobey, Boston, Mass. Cleveland, Brown & Co., Cleveland, Ohio. Wood & Leggat, Hamilton, Ont.

LABELLE STEEL WORKS'

REITER, LAVELLE & CO.,

MANUFACTURERS OF ALL KINDS OF

STEEL.

Also, Springs, Axles, Rake Teeth, &c.

OFFICE & WORKS, Ridge, Lighthill & Belmont Sts., & Ohio River, Allegheny. Post Office Address, Pittsburgh, Pa.

New Jersey Steel and Iron Company.

Trenton, N. J.,

Represented by COOPER, HEWITT & CO., 17 Burling Slip, New York,

MAKERS OF

ROLLED IRON BEAMS.

Channel Bars, the Trenton Steel Top Rails, &c., &c. Refined Iron, Brazier and Wire Rods.

ALSO,

THE MARTIN STEEL,

For Machinery Uses and Fire-Box Plates.

HOWSONS'

OFFICES FOR PROCURING

UNITED STATES AND FOREIGN

PATENTS,

Forrest Buildings

119 SOUTH FOURTH ST., PHILADELPHIA,

AND MARBLE BUILDINGS

605 Seventh St. (Opposite U. S. Patent Office,

Washington, D. C.)

H. HOWSON, Solicitor of Patents. C. HOWSON, Attorney Law.

Communications should be addressed to the

PRINCIPAL OFFICES PHILADELPHIA.

JAMES A. WHITNEY, Patent Agent

and Expert, offers his services to inventors in

securing American and Foreign Patents, as ex-

pert in patent law. He speaks from a

personal acquaintance. Any person seeking profes-

sional advice from him will be certain of just and hon-

orable treatment. Norwich, Conn., Daily Advertiser,

May, 29.

His long experience in this field of investigation

has made him familiar with the business in all its

branches, and we can confidently recommend him to

those needing his services." Prairie Farmer, Chicago,

June 1.

"Few persons have had more opportunities for

learning the necessities of such a business." The World

(weekly), New York City, June 19.

"A thorough mechanical engineer with a valuable

practical experience in the machine shop." Am. Rail-

road Journal, New York, June 19.

"Mr. Whitney is qualified by experience and prac-

tical knowledge. His life and experience have been

such as to develop him into a man of great sag-

acity in industrial pursuits, especially inventors.

His name is well known in New York, and he is

addressed for full information, free of charge,

128 Broadway, Room 11, New York City.

BOSTON.

(Reported by Macomber, Bigelow & Douse, 42 to 48 But-

terfly March St.)

Axes.—Forester's Favorite, Bronzed.....\$13 00

Blue Jacket, Blue.....12 50

Excelsior, Red.....12 50

Chopper's Pride, Bronzed.....11 00

Red Cross, Red.....10 50

Red Cross, Handled.....10 50

Boy's Handled Blue Jacket.....12 00

Bells.—Hand.....dis 60 to 10

Sleigh, hand, body strap, patent.....dis 30 to 40

bound, W. M. 30 bells, No. 1, per strap \$1 70

Sleigh, patent leather, cloth bound, W. M. 30 bells,

No. 1, per strap \$1 70

Sleigh, patent leather, leather bound, ex. tinned,

30 bells, No. 1, per strap \$2 30

Sleigh, patent leather, leather bound, silver plated,

30 bells, No. 1, per strap \$3 30

Sleigh, patent leather, leather bound, silver plated,

30 bells, No. 1, per strap \$3 30

Sleigh, shaft straps, W. M. House, No. 1, per pair

75c

Revels.—Star Tool Co.....dis 30 to 40

Revels.—Auger, France.....dis 30 to 40

Auger, Jennings.....dis 10 to 20

Boils.—Carrage, Common, new list.....dis 10 to 20

Horse, Carrage, Common, new list.....dis 10 to 20

Boring Machines.—Angle.....each \$3 to 4

Common, Shell's quality.....each \$4 to 5

Turn Table.—D. B. & Co., Fall, \$3 per doz. \$2 50

Braces.—Barber's.....dis 40 to 50

Backus's.....dis 40 to 50

Spoford's.....dis 40 to 50

Butts.—Union Drilled Loose Joint.....dis 40 to 50

Wire Fast Joint.....dis 40 to 50

Alden's Drilled Plain, Reversible.....dis 40 to 50

Acorn.....dis 40 to 50

Wrought Table Butts and Back Flaps.....dis 25 to 30

Wrought Narrow Butts.....dis 25 to 30

Castors.—Revised List.....dis 20 to 30

Chisels.—

Socket Framing, M. B. & D., warranted.....dis 60 to 10

Cordage.—Manila, no discount.....\$ 1.50

American Tarred Hemp Lath Yarn.....\$ 1.00

Corn Hooks.—Extra Quality.....dis 25 to 30

Cow Ties.....

No. 30, opening 3 ft., No. 5, with toggle.....\$ 3.75

No. 30, opening 3 ft., No. 5, with toggle.....\$ 3.75

No. 45, 3 1/2 ft., No. 5, snap.....\$ 4.00

No. 45, 3 1/2 ft., No. 5, snap.....\$ 4.00

No. 25, 4 ft., No. 4, snap.....\$ 4.50

No. 60, 4 1/2 ft., No. 3, toggle.....\$ 4.50

No. 60, 4 1/2 ft., No. 3, toggle.....\$ 4.50

Crow Bars.—Iron, Steel Points.....\$ 1.50

Enam. Ware.—Kettles.....dis 25 to 30

Enam. Ware.—Kettles.....dis 25 to 30

American.....\$ 5 to 6 currency, less 10c

Nicholson.....\$ 5 to 6 currency, less 10c

Funnel Irons.—\$ 2.00 \$ 2.50 \$ 3.00 per doz

Deep Flange, \$ 3.50 \$ 4.00 \$ 4.50 per doz

Gauges.—Star Tool Co.....dis 30 to 40

Hammers.—Maydole.....dis 5 to 6

M. B. & D., solid cast steel, adze eye, No. 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

ST. LOUIS.

Corrected weekly by Sample, Birge & Co.

Anylla.—Armitage.....\$ 1.50

Peter Wright.....\$ 1.50

Apple Parers.—Conqueror.....\$ 1.50

Turn Table.....\$ 1.50

Augers and Bits.—Cook's.....dis 25 to 30

Jennings.....dis 25 to 30

Snell's.....dis 12 to 15

Axes.—

Patent Taper Axles.....dis 10 to 15

Swelled Taper Axles.....dis 10 to 15

Concord Axles.....dis 10 to 15

Common Axles, 1 1/2 inch and upward.....\$ 1.50

Red Jacket Axles.....dis 10 to 15

Bells.—Troy, Church.....dis 10 to 15

Light Brass, Hand.....dis 10 to 15

Boils.—Arms, Bell & Co.'s Machine.....dis 10 to 15

Arms, Bell & Co.'s Carriage and Tire.....dis 10 to 15

Norway Iron Carriage and Tire.....dis 10 to 15

Cast Iron Barrel, Shuttle, &c.....dis 25 to 30

Cast Butt Hinges.—Narrow Fast Joint.....dis 25 to 30

Broad Fast Joint.....dis 25 to 30

Reversible.....dis 45 to 50

Loose Joint.—Acorn.....dis 40 to 50

Excelsior Reversible Blind.....dis 30 to 40

Lull & Porter's Blind.....dis 35 to 40

Table Hinges.—Narrow.....dis 25 to 30

Reversible.....dis 20 to 25

Back Flaps.....dis 25 to 30

Inside Blind Hinges.....dis 25 to 30

Casters.—Troy's Wheel Bed or Plate.....dis 15 to 20

Chain.—Eng. Coll. 3-16 1/2 5-16 7-16 9-16

Trace.....dis 10 to 15

German Coll and Halter.....dis 10 to 15

American Coll.—Short Link.....dis 10 to 15

Size, inches.....\$ 1.10 \$ 1.30 \$ 1.50

Price, cents.....\$ 9.50 \$ 8.50 \$ 8.50

Price, cents.....\$ 11.10 \$ 1.10 \$ 1.10

Price, cents.....\$ 8.50 \$ 8.50 \$ 8.50

All larger sizes same price as 1 1/2 in. Stud chain less

than same size close

Chisels.—Socor, Firmer or Framing.....dis 25 to 30

Clothes Wringers.—Colby's.....\$ 2.00

Novelty.....\$ 2.00

University.....\$ 2.00

Monitor.....\$ 2.00

Corn Mills.—Parker's.....dis 10 to 15

Corn Knives.—Dunn Edge Tool Co.'s Clip.....\$ 2.00

District.....\$ 2.00

Crow Bars.—Solid Cast Steel.....\$ 2.00

Cutlery.—J. Russell & Co.'s.....dis 15 to 20

Lantern, Goodnow & Co.'s.....dis 15 to 20

Landers, Frary & Clark's.....dis 15 to 20

Fishes and Raps.....\$ 5.00 to the 2, currency

Nicholson's Other Files.....\$ 5.00 to the 2, currency

Butcher's Files.....\$ 5.00 to the 2, currency

Heiler & Bros. Horse Raps.....\$ 5.00 to the 2, currency

Forks and Hoos.....

Auburn Mfg. Co.'s Hay and Manure Forks.....dis 25 to 30

Planter Eye Hook.....dis 20 to 25

Winsted's Planter Eye Hook.....dis 20 to 25

Hammers.—Yerkes & Co.'s.....dis 25 to 30

Mason's Hammer.....dis 25 to 30

Smith Hand Hammer.....dis 25 to 30

Handles.—Axe.....dis 25 to 30

Pick.....dis 25 to 30

Smith & Montross Fork, Hoe and Rake.....dis 10 to 15

Broom and Mop.....dis 10 to 15

Harrow Teeth.—1 inch iron.....dis 5 to 6

2 inch iron.....dis 5 to 6

3 inch iron.....dis 5 to 6

Harbed or Head.....dis 5 to 6

Hatchets.—Hunt's.....dis 5 to 6

Simmons.....dis 5 to 6

Hay Knives.—Lightning.....dis 5 to 6

Dunn Edge.....dis 5 to 6

Fishes.....dis 15 to 20

Hinges.—Strap and T.—St. Louis make.....dis 25 to 30

Horse Nails.—Europe.....dis 25 to 30

Available.....dis 25 to 30

Northwestern.....dis 25 to 30

National Patent Point.....dis 25 to 30

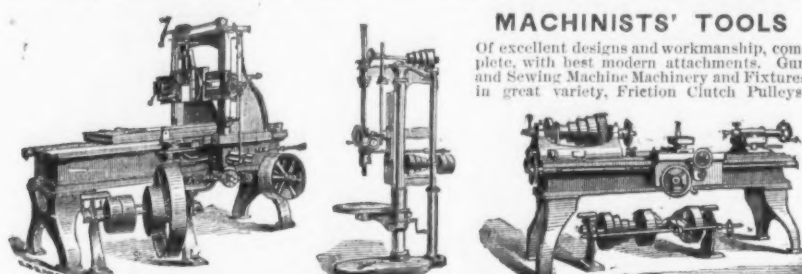
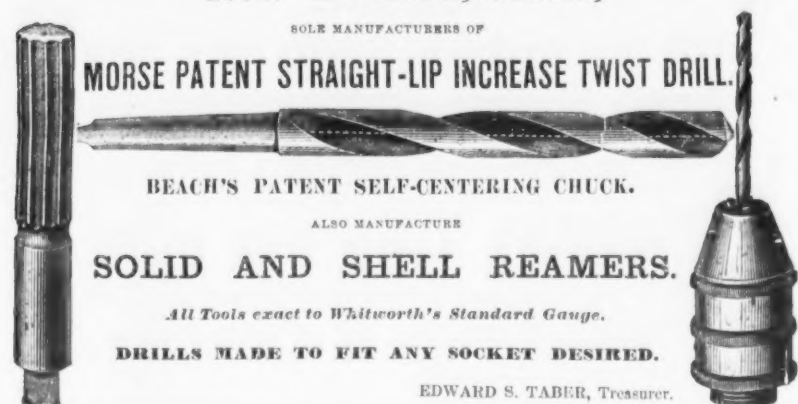
Horse Shoes.—R. I. Extra Finished.....\$ 7.00

Burden's.....\$ 7.00

Mule Shoes.....\$ 1.00 extra



## Machinery, &amp;c.

Morse Twist Drill and Machine Company,  
New Bedford, Mass.,

Water-Power Organ Blowing Apparatus, Special Machinery, &c., made by  
**THE PRATT & WHITNEY COMPANY, Hartford, Conn.**

Established 1848.

**WM. SELLERS & CO.,**

1600 Hamilton Street, PHILADELPHIA.,

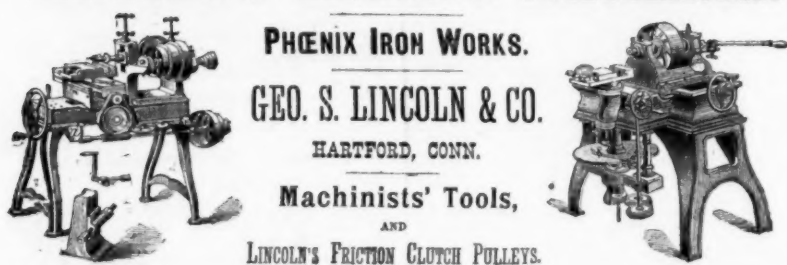
**Engineers, Iron Founders and Machinists.****RAILWAY SHOP EQUIPMENTS.**

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters  
Are of Improved and Patented Construction.

Railway Turning and Transfer Tables,  
SHAFTING & MILL GEARING, a specialty.

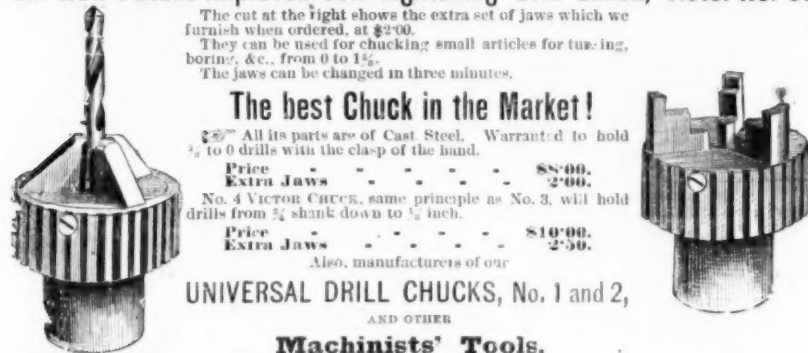
**Pivot Bridges.**

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.

**LINCOLN'S MILLING MACHINES.****The Hubbard & Curtiss Mfg. Co.,**

No. 82 Chambers St., N. Y., Manufacturers of

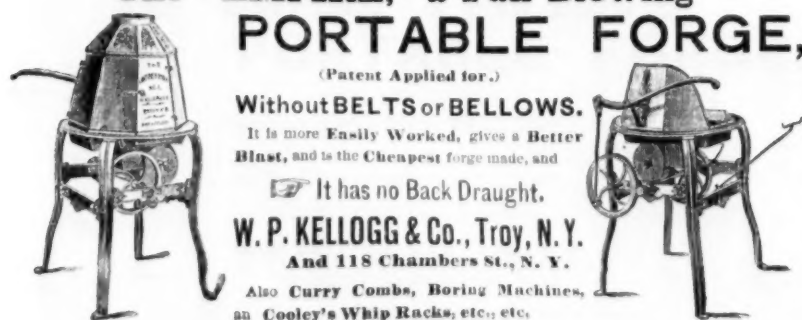
Our New Patent Improved Self-Tightening Drill Chuck, Victor No. 3.

**FLUTING MACHINES,**

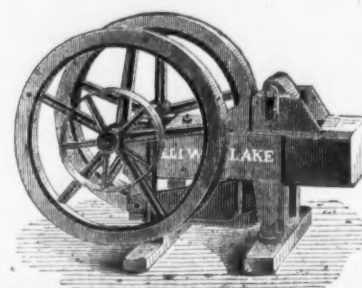
Eureka, Peerless and K. F. M. Improved,

**PIANO STOOL SCREWS.**

LOWERRE & TUCKER, 23 Railroad Place, Newark, N. J.  
Send for Price List.

**The "EMPIRE," a Fan Blowing PORTABLE FORGE,**

## Machinery, &amp;c.

**IMMENSE SAVING OF LABOR.****BLAKE'S****PATENT****CRUSHING MACHINE**

for reducing to fragments (of any required size) all kinds of

**Hard and Brittle Substances, such as**

**ROCKS, ORES, MINERALS AND DRUGS.**

For Circulars containing particulars and numerous testimonials, for Price Card, or for other information in the premises, address

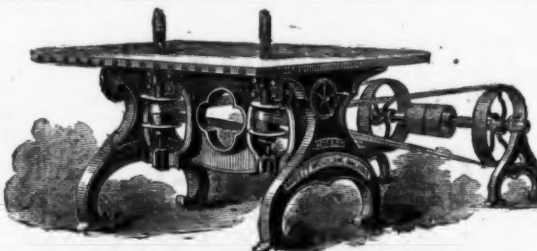
**BLAKE CRUSHER CO., New Haven, Conn.,**  
or, E. S. BLAKE, Pittsburgh, Pa.

Persons visiting New York City can see a Crusher in operation at 137 Elm Street, where M. B. WASHBURN will give information and prices and receive orders.

**A. S. GEAR,**

Sole Owner and Manufacturer of the GEAR VARIETY MOULDING MACHINE,  
LEGALITY OF PATENTS SUSTAINED BY THE U. S. CIRCUIT COURTS,

56 to 62  
SUDBURY  
STREET,



BOSTON,  
MASS.

MANUFACTURER AND DEALER IN ALL KINDS OF

Wood and Iron Working

**MACHINERY,**

STEAM ENGINES AND MECHANICAL SUPPLIES,  
Railroad Car Shops fitted out Complete. Send for Catalogue and Price List.

**FISHKILL LANDING MACHINE CO.,**

[Established 1853.]

**FISHKILL-ON-THE-HUDSON, N. Y.**

MANUFACTURERS OF

**STEAM ENGINES,**

**And MACHINERY of every Description.**

New York Office, 63 Bleecker Street.

AS. L. TELLER, Secy.

MIL0 SAGE, Prest.

**THORNE, DeHAVEN & CO.,**

Twenty-first Street, above Market, Philadelphia.

PATENT

PORTABLE DRILLING MACHINES

PATENT

RADIAL DRILLING MACHINES.

**VOLNEY W. MASON & CO.,**

Manufacturers of patent

**FRICTION PULLEYS,**

Friction Clutches for connecting Shafting & Gearing  
Hoisting Machinery for Elevators  
Mines, Quarries, Fork Packing Houses  
Abattoirs, Warehouses, etc.  
SHAFTING, HANGERS and GEARING  
PROVIDENCE, R. I.



## Machinery, &amp;c.

**ANDREW WATSON,**  
**MACHINIST and ENGINEER,**Nos. 537 & 539 Dickinson Street,  
Near Trenton Avenue, 19th Ward, PHILADELPHIA.

Builder of Vertical Steam Engines and Boilers, peculiar for their economy of space and fuel, safety and quickness in raising steam. Also, sole manufacturer of Improved Balance Governor with automatic stop, Balance Slide Valve, Safety Valves, Stop Valves, Improved Pistons for Engines, which require no setting by the Engineer. Engine Builders and Dealers supplied with Governors, Stop Valves, Safety Valves, &amp;c., &amp;c. These governors are fitted up in the very best manner, with brass Valves and Seats, which will not corrode or stick fast. Guaranteed to regulate under any irregular load which an Engine is subject to. Millwright work executed, and Machinery in general satisfactorily repaired. Engines Indicated Promptly and with the Greatest Accuracy.

**EDWIN HARRINGTON,**

MANUFACTURER OF

**ENGINE LATHES,**  
AND OTHER MACHINISTS' TOOLS,

Corner of North Fifteenth St. &amp; Pennsylvania Ave., Philadelphia

**BAND SAW MACHINERY**For Ship & Car Builders, Agricultural, Wagon,  
Pattern and Cabinet Shops.

"Perin" French Band Saw Blade

KEPT IN STOCK.

**RICHARDS, LONDON & KELLEY,**

22nd above Arch, PHILADELPHIA.

**P. BLAISDELL & CO.,**

Worcester, Mass.,

MANUFACTURERS OF

**Engine Lathes & Drill Presses.**

Rollstone Machine Works,

Fitchburg, Mass., Manufacturers of

Rotary Bed Planers, Band Sawing Machines, Wardell's Patent Saw Benches, Blind Slot Planers, Buzz Planers, Long Plane Jointers, Jig Sawing Machines, Flint's Patent Saw Mills, Boring Machines, Pattern Makers' Lathes, Gauge Lathes, with Kilburn's Smoothing Knife Attachment, Wheeler's Patent Fan Blowers, Patent Self-Oiling Pulleys, Chair Machinery, &amp;c., &amp;c.

E. T. MILES, Pres. JAS. GOODRICH, Sup't &amp; Treas.

**RICHARD DUDGEON,**

No. 24 Columbia Street, New York,

MAKER AND PATENTEE OF

**Hydraulic Jacks and Punches,****ROLLER TUBE EXPANDERS****And Direct-Acting Steam Hammers.**

Communications by letter will receive prompt attention.

**JACKS** for Pressing on Car Wheels or **CRANK PINS** made to order.**The Bessemer Steel Works,**

of John A. Griswold &amp; Co.

Troy, N. Y., May 3, 1872.

**B. F. Sturtevant, Boston, Mass.,**

Dear Sir,—We have changed your No. 8 for your No. 9. Pressure Blower. The time in melting is about the same with either Blower. We are melting 225,000 lbs. (112½ tons,) Pig Iron daily, (20 hours running time.) It works well.

**BARNEY MEE, Supt.****The Yale Iron Works,**  
NEW HAVEN, CONN., Manufacturers of**STEAM ENGINES** of all kinds,

With or without Rider's Patent Variable Cut-off. Boilers, Heaters, Pumps, Gauges; in fact everything required to complete an Engine; Lathes, Planers, Rubber and Power Presses; all kinds of Iron Castings for Architectural and other purposes; Wrought Iron Girders; Machine Forgings; Stable Trimmings; Drinking and Fire Hydrants; Pulleys and Shafting; Pipe Fitting and JOBBING IN ALL ITS BRANCHES.

Agents for Ames' Portable Engines, Judson's Patent Governor, Fairman & Co.'s Lathe Chuck, and Water's Patent Heater.  
WM. D. PARDEE, Pres. and Treas. GEO. E. LUM, Secy.

## Machinery, &amp;c.

**FERRIS & MILES,**

24th &amp; WOOD STS.,

(Take Arch or Race &amp; Vine Street Cars.)

**PHILADELPHIA.****Steam Hammers, Drops, Etc.,**

With our latest Improvements.

60 different styles and sizes, extra long or short stroke, from 100 lbs. upward, suited to every kind of work in Iron and Steel.

Our patent balanced valve gear of but three moving pieces, takes up its lost motion by gravity. It reduces to a minimum, the required steam power, friction, wear and repair.

Having this season more than doubled the capacity of our works, we are now prepared to furnish, in addition to our celebrated Steam Hammers, a full line of Machinery Tools from new designs, embodying valuable improvements which will render them superior to any now in the market.

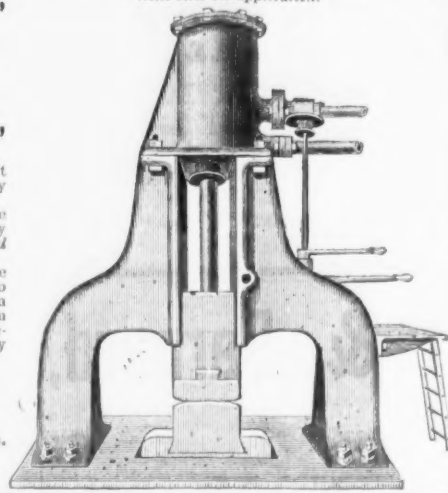
Special attention given to

Car Wheel Bore, Car Wheel Presses, Axle Lathes, Axle Cut off and Centering Machines.

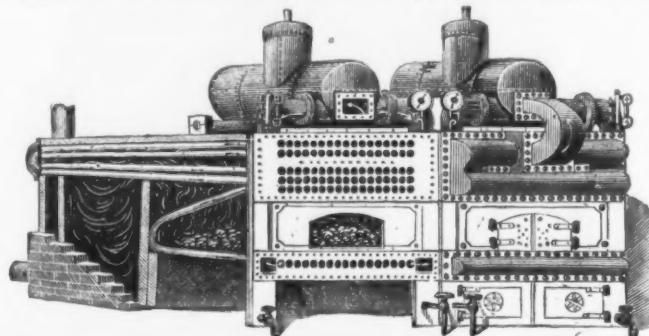
**W. H. CUNNINGHAM, Salesman.**

We employ no agents.

Photographs, Prices, Foundation Drawings, and full descriptions sent on application.

**THESE BOILERS**

Have stood the most severe tests for the past eight years without an accident.

**SAFETY STEAM BOILER MFG. CO.,**  
THOMAS VERNER, Proprietor,

MANUFACTURER OF

Non-Explosive Boilers, Steam House Heaters, Engines &amp; General Machine Work

These Boilers are safe from explosion: are very durable and economical, both in fuel and repairs. They have few joints or connections, and none of these is fire surface, perfectly free expansion; the circulation of water through the tubes keeps them perfectly clear of scale and sediment.

WORKS: 30th and Chestnut Streets, PHILADELPHIA.

**BUSH HILL IRON WORKS,**Corner 16th & Buttonwood Streets,  
PHILADELPHIA.**JAMES MOORE,**

(Successor to MATTHEWS &amp; MOORE.)

Engineer, Machinist, Founder and Boilermaker,

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE.

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or Composition Metals.

Sugar Mill, Saw Mill and Crist Mill Machinery, AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of TANK AND PLATE IRON WORK.

**AMERICAN DREDGING COMPANY.**OFFICE No. 214 SOUTH DELAWARE AVENUE,  
PHILADELPHIA.  
JOHN SOMERS, PRESIDENT. F. B. COLTON, SECY & TREAS.Contractors for  
River, Harbor and Bank  
Improvements,Steam Dredging Machines,  
Steam Tugs, etc.**New York Steam Engine Co.,**

MANUFACTURERS OF

Engine Lathes, Planers, Bolt Cutters, Upright Drills

AND

**MACHINISTS' TOOLS**

OF ALL DESCRIPTIONS.

OFFICE AND WAREHOUSE, 98 Chambers Street, New York.

WORKS AT PASSAIC, NEW JERSEY, WITHIN 11 MILES OF NEW YORK CITY.

GEORGE PEACE, President,

G. A. CHEEVER Treasurer.

## Machinery, &amp;c.

**WESTON'S**

PATENT DIFFERENTIAL

**Pulley Blocks,**

Warranted superior to any made.

**RATCHET DRILLS,**

Machine Finished, Case Hardened and Interchangeable.

HOOKHAM'S PATENT STEEL

**Ribbon Sash Line,**

Working qualities superior, decidedly ornaments carefully lacquered, and will remain so.

**VAN WART & MCCOY,**

Sole Agents,

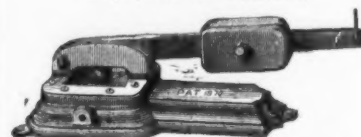
43 Chambers Street, New York.

**JAMES HENSHALL,**Engineer, Machinist & Blacksmith  
1036 Bench St., PHILADELPHIA.

Drawings made to order. Repairing of all kind promptly attended to. Blacksmithing executed in all its branches.

**IMPROVED GAGE COCKS.**

Simple, Durable and Efficient.

**Automatic Damper Regulator**

FOR STEAM BOILERS.

SAFETY, ECONOMY & DURABILITY  
MURRILL & KEIZER, Baltimore.  
Agents Wanted. Send for Circulars.**HENRY BLUNDELL & CO.,**  
**MACHINISTS,**

And Manufacturers of

**JEWELERS' TOOLS**

of every description.

BRASS FOUNDERS &amp; FINISHERS.

Barry's Steam Cylinder Packing

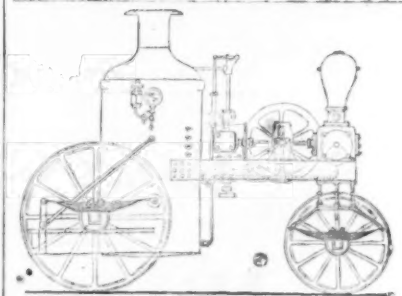
PATENTED JUNE, 1872.

**LITTLE'S PATENT CART HOIST.**For State Rights, and Rights to manufacture, or further information, address  
Nos. 98 to 106 Orange, & 63 to 69 Peck St  
PROVIDENCE, R. I.  
Price List sent free on application.**PUNCHING  
PRESSES.**For the Best and Cheapest, address THE STEEL & PARKER PRESS CO.,  
MIDDLETOWN, CONN.

MAYER'S BOILER COMPOUND for the Removal and Prevention of Scale and Sediment from Steam Boilers.

It is entirely free from acids; for efficiency it is the cheapest invented. Price, 25 cents a pound. Parties trying this compound and finding it better than represented are freed from any cost. All I ask is a fair trial, and insure satisfaction. I will send to any party as many pounds as they need for trial, and ask payment only after they are satisfied. 1-3 of a pound for each horse power for first trial; after, 1-8 of a pound every two weeks. Send for Circulars.  
I. MAYER, Manufacturer, 99 Mercer St., N. Y.**PERSEVERENCE****STEAM ENGINE WORKS,**

Steam Engines and Boilers,

From 2 to 100 horse power, built to order. A supply of second hand Boilers and Engines always on hand.  
J. W. WRIGHT, 112 Spruce Street, Phila.STEAM FIRE ENGINES,  
Low Price, Light Weight. Manufactured by  
Phila. Hydraulic Works, Philadelphia, Pa.**TAWS & HARTMAN,**  
**ENGINEERS,**

1235 and 1237 North Front St., Phila.

Blast Furnaces and Rolling Mills  
DESIGNED AND CONSTRUCTED.

Drawings for Machinery made, and Estimates furnished. Special Fittings for Blast Furnaces on hand and made to order.

Taws &amp; Hartman's Patent Air Hoist.

AGENTS FOR

KENT'S PATENT HOT BLAST PIPE.  
Thomas' Pat. Safety Lift for Bell & Hopper prevent explosions. Also,  
HOBSON'S PATENT WATER BREAST.



